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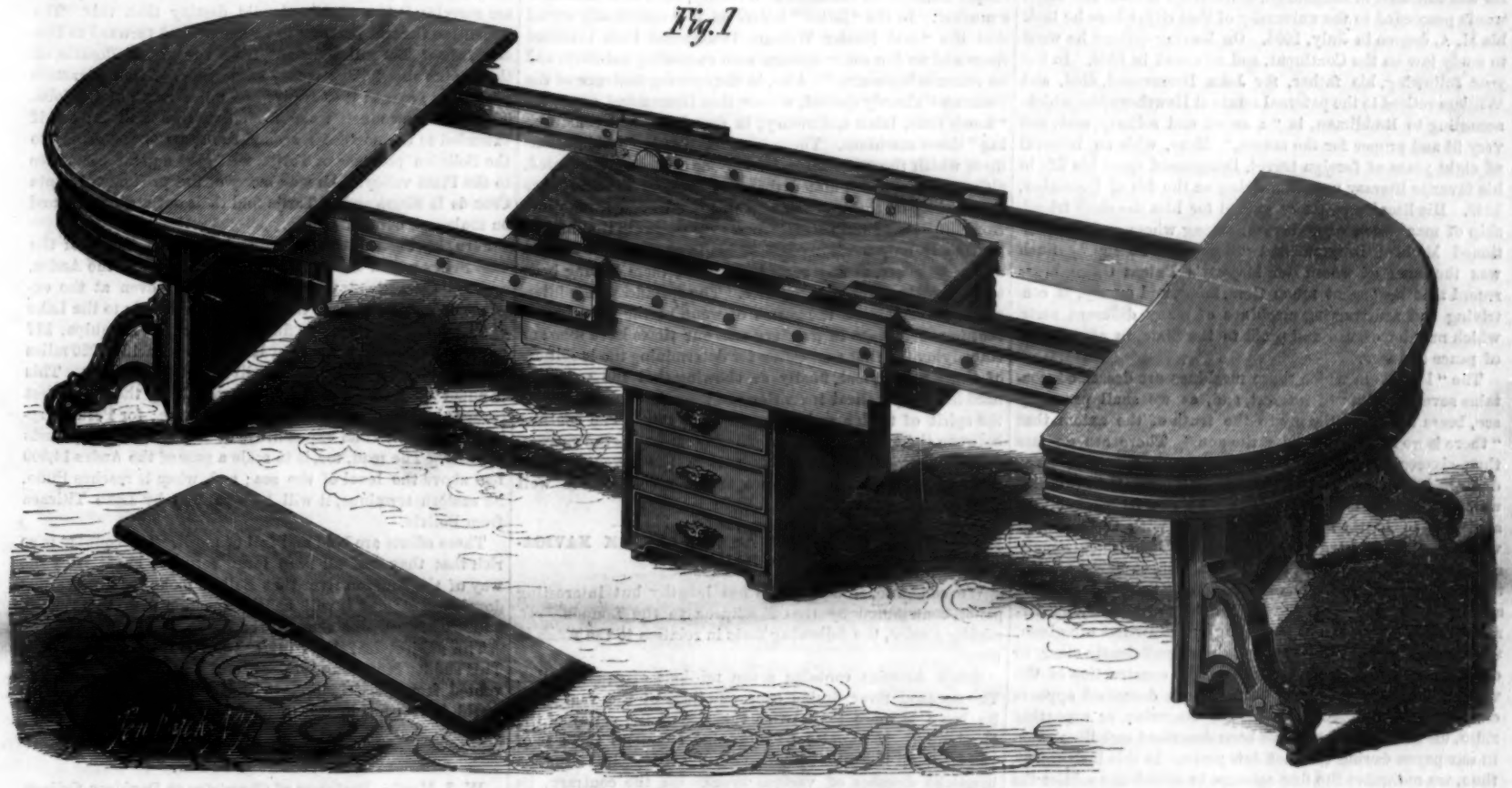
Improved Extension Table.

Our engravings give an excellent idea of the form and appearance of an improved extension table, which combines a convenient receptacle for table covers, napkins, and other table articles, and a space for storing the sections of the top, with other improvements mentioned below. The whole forms one of the most neat, compact, and convenient extension tables we have ever seen.

The tongues and grooves of the extension rails are formed of metal plates, rebated or set out from the rail by intervening strips so as to form the proper tongues and grooves. The forming of the grooves and tongues thus of metallic plates allows the rails to slide freely, the shrinking, swelling, or warping of the rails not interfering with their working. By this arrangement, also, the space usually taken up by the rails is so much reduced that ample room is obtained for storing the sections of the top, or "filling."

The pieces of the filling do not differ materially from those of ordinary extension tables, except that they are hinged as shown in the engraving, in order that they may be folded for more convenient storage under the table top, in the space allotted to them, and also that the method of doweling them together is somewhat changed and improved.

Fig. 1



LENZ'S IMPROVEED EXTENSION TABLE.

Fig. 2

The holes for the dowel pins are elongated, so that a hook attached to one side of the middle of each section may engage with a slotted metallic plate recessed into the juxtaposed section to which it is doweled. The sections are thus not only doweled but hooked together, which holds them much more firmly than in the old method of doweling alone.

The storing of the sections in the manner described is a very great convenience, obviating the necessity of a separate receptacle for them, and their carriage to and fro when required for use.

A set of drawers is also provided, as shown for the reception of napkins, table-covers, rings, etc., the bureau being placed in the center and forming the pedestal or support for the middle set of rails, and being entirely out of the way and nearly concealed from view when the table is extended. Four legs form the corners of the bureau, as shown, the case being built up between the legs. For drawers, doors and shelves may be substituted. The legs of the table, including those of the bureau, are furnished with casters in the ordinary manner.

This table is covered by three patents, obtained through the Scientific American Patent Agency, bearing dates respectively September 7, 1869, and March 15, 1870, and (reissued) May 3, 1870. Specimens of the table may be seen at J. G. Reitner's furniture store, corner Navy and Fulton streets, Brooklyn; N. Y., and a model is exhibited by Rudolph Lenz, 85 Duane street, New York. Correspondence concerning the purchase of rights should be addressed to Charles P. Lenz, patentee, Poughkeepsie, N. Y.

Preservation of Phosphorus.

Unless phosphorus be carefully preserved in the dark, it becomes coated with a film of suboxide, and in a few months loses its characteristic transparency. Dr. Siewert, of Halle, suggests a method by which the sticks can be kept, even in the light, without undergoing deterioration. For this purpose, he takes advantage of the well-known property of phosphorus to reduce some metals from their solutions. The sticks of phosphorus are put into a cold saturated solution of the sulphate of copper. Presently they become coated with a deposit of metallic copper, and in this state resemble copper rods. They can now be removed to a bottle containing water, and will keep for years. When a stick is wanted for any purpose, on removing the metallic film, and scraping off a black deposit underneath it, the phosphorus will be found to have retained its translucency, as if it had been freshly cast.

Lapland Glue.

The bows of the Laplanders are composed of two pieces of wood glued together; one of them of birch, which is flexible, and the other of the fir of the marshes, which is stiff, in order that the bow, when bent, may not break; and when unbent, it may not bend. When these two pieces are bent, all the points of contact endeavor to disunite themselves; and to prevent this, the Laplanders employ the following cement. They take the skins of the largest perches (it is probable that eel skins would answer the same purpose) and having dried them, moisten them in cold water until they are so soft that they may be freed from the scales, which they throw away. They then put four or five of these skins in a reindeer's bladder, or they wrap them up in the soft bark of the birch tree, in such a manner that water cannot touch them, and place them, thus covered, in a pot of boiling water, with a stone above them, to keep them at the bottom. When they have boiled about an hour, they take them from the bladder or bark, and they are then found to be soft or viscous. In this state, they employ them for gluing together the two pieces of their bows, which they strongly compress, and tie up until the glue is well dried. These pieces never afterwards separate.

ELASTIC METALLIC ROCKING CHAIR.

Our engraving illustrates a rocking chair, the frame of which is made entirely of elastic metallic straps, bent in the form shown, and upholstered either in the way indicated or in any other appropriate manner. The construction of this chair, while it does not interfere with its comfort as a rocker, adds to it the pleasure of a spring seat. As will be seen, it is of a form easily manufactured, and if properly made, should prove much more durable than a wooden chair. It is the invention of Hermann Berg, of Springfield, Mass.

It is believed that the principal preservative substance used in embalming the mummies of Egypt was carbolic acid in the crude state.

POETRY AND PATENTS.

It is well said that extremes often meet, although we do not often find them united in one and the same person. In a mind which is susceptible of all the higher flights of poetical imagination, we should hardly expect to find associated ideas of a mechanical nature. In other words, we should not look for an inventor in the person of a poet, especially in one whose poetry possesses a singular sweetness, combined with elevation of sentiment and grace of expression. But we often find that which we do not look for, and thus it happened that in a visit to the Patent Office library last week we found a recently printed copy of a translation from a patent granted in the reign of King Charles II. It bears date the 29th of September, 1626, and was granted to one "Master William Drummond, of Hathorneden," the subject matter being the construction of machines, weapons, and engines of war for attack or defense by land or sea. Before, however, entering upon a description of the inventions, some of which are very interesting, we will offer a few brief remarks concerning the inventor. This personage, then, was none other than William Drummond, of Hawthornden, the well known poet, who achieved considerable celebrity in his day. He was descended from a very ancient and noble Scottish family, and was born on the 13th of December, 1585. He was educated in Edinburgh, at the High School, and afterwards proceeded to the university of that city, where he took his M. A. degree in July, 1605. On leaving college he went to study law on the Continent, and returned in 1609. In the year following, his father, Sir John Drummond, died, and William retired to the paternal estate at Hawthornden, which, according to Ruddiman, is "a sweet and solitary seat, and very fit and proper for the muses." Here, with an interval of eight years of foreign travel, Drummond spent his life in his favorite literary pursuits, dying on the 4th of December, 1649. His literary celebrity gained for him the close friendship of many men of eminence, among whom may be mentioned Michael Drayton and "Rare Ben Jonson." Such was the man of whom Her Majesty's Patent Office bears record that he "spent much time, labor, and money, in contriving and constructing machines of many different sorts, which may be of use and profit to the State, in affairs both of peace and war."

The "letter" in which these machines are described, contains several points of interest, and, as we shall presently see, bears ample testimony to the truth of the axiom that "there is no new thing under the sun." There are no less than sixteen inventions notified, although only fifteen are described. The first of these is an instrument for cavalry use, by which it is said that one man can be rendered as available in battle as five or six men with the ordinary weapons. The instrument is stated to be also extremely suitable for foot soldiery, and, from its effect being at once terrible and rapid, the inventor calls it a "thundering staff," adding that some call it "box pistoll," "musket box," "carrabin," or "box-dragoun." Although no drawings are given, the descriptions are, for the most part, sufficiently clear to enable us to realize approximately the construction of the various weapons. Hence, the one just described appears clearly to be the prototype of the magazine or repeating rifles, of which so many have been described and illustrated in our pages during the last few years. In this instrument, then, we recognize the first attempt to afford the soldier the means of keeping up a rapid and continuous fire; the idea, however, waited for full practical development until the time of the late American war. The second invention is termed a shooting spear, with which a foot soldier, besides doing his own duty, could fill the place of five or six musketeers. This would appear to be a gun with a blade answering to the bayonet at the end of it. The third machine is very special in its way, being described as made of "musket barrels fastened together, by the aid of which any soldier may be considered able to fill the place of a hundred musqueteers. This machine may, from its effect, be called a lightning chariot, in the vulgar tongue, fyerie waggon." There can be no mistake as to the identity of this instrument with the machine guns and mitrailleurs of the present day. It was evidently a group of gun barrels fastened together and arranged for rapid firing, the whole being borne on a carriage. The fourth invention is an engine of war of similar character to the previous one, and is for use either by land or sea. It was to fire five balls in the same as it then took to fire one, and it was called "open ordinance." So far as this description goes, we see no reason why Master William Drummond should not be credited with the invention of breech-loading ordnance. The remainder of Drummond's inventions relating to the art of war include mortars for defending walls or ships, movable towers, and a ship which was to enter any ports, no matter how well they were barricaded or defended, and which could destroy ships by fire or forcibly capture them. This ship was to be immense and of terrible effect, and was to be called *Leviathan*. It is not possible, from the meager description before us, to say whether this vessel was in any sort a prototype of the "Great Eastern," or whether she was a huge sea torpedo. Following these warlike inventions come others relating to the arts of peace. These include an instrument for measuring the force of the wind; a light, rapid-moving boat; an instrument "by which the distance of a voyage may be exactly calculated, and the different longitudes of places, either at sea or on the nearest shore, determined." Then we have a distilling apparatus for use at sea, to provide ships with fresh water, made from salt water at a very small expense; burning glasses for setting objects on fire either by land or sea; telescopic glasses; and finally, that *pons asinorum* of ancients and moderns, perpetual motion. Amongst these latter inventions will be noticed one for ascertaining longitude. This is a point of interest, inasmuch as it is apparently the first recorded suggestion of a means for discovering the longitude of ships at sea. It was not until 1674 that a Frenchman named St. Pierre proposed to Charles II. a method of doing this. On the proposal being submitted to a committee of astronomers, Flamsteed, who was one of the committee, drew attention to the incorrectness of the lunar tables, by which the position of the moon among the fixed stars was to be calculated. Charles was struck by the deficiency, and immediately founded the Observatory at Greenwich, giving Flamsteed the title of astronomer royal, with a salary of £100 per annum. Previously to this, it does not appear that any attempt at determining the longitude of a ship while at sea had ever been made.

It will thus be seen that there are several sound practical ideas embodied in this singular patent, and such as are very rarely, if ever, found associated with the Muses. That these inventions were not the mere offspring of a poetical idealism, which transformed the ordinary appliances of warfare and science into fantastic shapes, and gave to them multiple forms, seems clear from other portions of the document. There is evidently something more here than would result from a poetic mind simply investing ordinary matter-of-fact objects with its own imagery, or conjuring up forms and shapes founded on the basis of a reality, such as a cannon or a musket. In the "letter" before us, it is specifically stated that the "said Master William Drummond hath invented these and no few other matters with exceeding industry, and no common ingenuity." Also, in the opening sentence of the document already quoted, we see that Drummond expended "much time, labor and money, in contriving and constructing" these machines. These facts formed the considerations upon which the patent for twenty-one years was granted, although it was stipulated that the inventor should reduce one or more of the machines to practice within three years from the date of the patent. It is thus probable that he had previously only made models of his inventions; we are not aware, however, of any record of any of them having been subsequently reduced to practice. The specification is interesting as containing the germs of some of the most important improvements in gunnery that our times have seen; as embodying the first suggestion for determining the longitude of ships at sea, and finally as showing that the genius of hard-headed practical invention can sometimes co-exist with the spirit of tender and imaginative poetry. The contrast between the two conditions of mind necessary to the successful development of either the poet or the inventor, is so great as to render an instance of their co-existence well worthy of notice.—*Mechanics' Magazine.*

FACTS ABOUT THE RIVER AMAZON.—STEAM NAVIGATION AND RAILROADS.

We condense, from a somewhat lengthy but interesting paper, contributed by Geo. E. Church to the London *Fortnightly Review*, the following facts in relation to the Amazon river:

South America contains seven millions of square miles. The Amazon river drains over one third of this vast area. Its basin is more than twice the size of the valley of the Mississippi. It would hold forty-nine countries the size of England. It is generally supposed that its tropical situation bespeaks diseases of various types. On the contrary, its general health is far superior to that of its North American rival, while some of its districts, especially those of Bolivia and Matto-grosso, are blessed with the same delightful temperature which characterizes the table-lands of Mexico. The principal reason for this general health is that constant sea-breezes blow up the valley. Dry when they leave the coast of Africa, they become saturated in their ocean transit westward. They distribute their moisture, ever on a decreasing scale, from the mouth of the river upwards, until, entirely drained, they sweep across the Pacific coast range of the Cordillera of the Andes, to parch the shores of Peru.

Only by floating upon the majestic tide of the Amazon does one get an idea of its mass of waters. The Mississippi river poured into it near its mouth would not raise it six inches. In Bolivia, on the Beni branch of its Madeira affluent, two thousand miles from its outlet, it is one hundred and seventy feet deep. It presents still more astonishing soundings the same distance up the main stream. With its branches, it offers not less than fifteen thousand miles of waters suitable for steamboat navigation. The Bolivian affluents of its main branch alone count three thousand miles of river navigation. One half of this is suitable for steamers drawing six feet of water, and the other half for craft drawing three feet.

There is but one obstacle between the Atlantic Ocean and the heart of Bolivia, *viâ* the Amazon river; this is the line of rapids of the Madeira, at the northeast angle of Bolivia. They are rocky obstructions, found at intervals in the river, and are eighteen in number. They have a total fall of $228\frac{4\,1}{1\,0\,0}$ feet, with a length of broken water of 64,505 feet. The total fall in the navigable stretches between them is $43\frac{3\,5}{1\,0\,0}$ feet. This makes a total from the upper rapid of Guajará-merim to the lower, called San Antonio, of $272\frac{3\,6}{1\,0\,0}$ feet. The total length of river between these two points is $229\frac{3\,8}{1\,0\,0}$ miles, of which 217 miles are of clear channel, perfectly navigable, with a depth of water from 10 to 120 feet in the dry season.

It was in 1853 that the first steamers commenced running on the Amazon river. The year previous to this, the imports and exports were but £413,926 sterling. The effect of steam was similar, to some extent, to the resultant in the Plata valley. The difference was that the Brazilian valley had not the same temperature nor the same population as the Plata had. The fault was that no effort was then made to reach the real populated section of the Amazon basin—Bolivia. Had this been done at that date, we should now see a commerce, entering and clearing at Pará, far in excess of any figures shown at the ports of Buenos Ayres and Montevideo The borders of the Amazon would have presented along their whole extent little ports and towns, the centers of commerce, and of efforts to bring the adjacent lands into use, and thus furnish outlets for the over-crowded States of Europe. But 1870 promises to commence what should have been done in 1853.

On the lower Amazon there are now running sixteen steamers, and their number is being rapidly increased from the United States. The present ones are mostly of English construction, and appear to be unsuited to the commerce, so much so that most of the new ones lately sent out are of the Mississippi river pattern, flat bottom, and affording great facility for ventilation. There are two now nearly finished in the United States for the Bolivian rivers, above the rapids. They belong to the National Bolivian Navigation Company, lately chartered by the Congress of the United States. This company is the owner of concessions of great value from the Government of Bolivia.

Three great efforts are now making to reach this inexhaustible treasure house of old Spain—the new Bolivia. On the south, the energy of the Argentine Republic is brought to the problem, and will accomplish all that nature will permit; for there is no country in South America whose people are carrying it to a more splendid destiny than this. The Argentine Central Railway has been pushed forward to Cordoba, about 250 miles distant from the port of Rosario, on the Parana river. The steady earnestness of its contractors promises to extend it to Jujuy, 585 miles north of Cordoba. This will draw much trade from Southern Bolivia; and if extended to the northeast, around the spurs of the Andes, to the Bolivian province of Tarija, will give a great commerce to the Plata valley. Already many of the products of Santa Cruz de la Sierra and of Tarija find their outlets by carts and on muleback over this route.

Peru, having at Tacna, Arica, and Arequipa, tasted of the vast riches which lie upon the eastern slope of the Andes, appears determined to retain a little of it, even at the expense of a railway from the coast of the Pacific to the Lake of Titicaca. This road is finished as far as Arequipa, 117 miles distant from the port of Islay, on the Pacific: 220 miles more, making in all 337 miles, will complete the work. This is under contract. Certainly, the wealth in the northwest corner alone of Bolivia must be astonishing; for Peru is trying to reach it at an expenditure of ten millions of pounds sterling. The road, too, is to scale a pass of the Andes 14,600 feet above the level of the sea; and, when it reaches Puno, its eastern terminus, it will be separated by Lake Titicaca from Bolivia.

These efforts are bold and full of merit. The country is so rich that they will all reap large returns; but it is by the way of the Amazon river that Bolivia looks for her greatest development; and it will be in connection with the Amazon valley of Brazil that she will receive it.

The subject is full of interest for Europe and America. This sudden launching into notice of a country hitherto prevented from participating in the general progress of the world, is of considerable moment to commerce and civilization.

Kerosene Frauds.

W. J. Martin, Professor of Chemistry at Davidson College, N. C., writes to the *American Chemist* as follows: "I have been making some experiments on the photometric and economical value of the different kinds of *burners* for kerosene lamps, with a view to publishing the results in a local paper for the information of our people. During the progress of the experiments, I have been led incidentally to test the flashing and burning points of a number of samples of oil which came into my hands, and one specimen examined today is so remarkable that I send you an account of it, to be used as you think fit. This kerosene was bought of Trimble & Barrick, Philadelphia, and is marked on one head of the barrel, "*Brilliant Refined Burning Oil. Philadelphia A. F. Beam,*" and on the other head, "M. Evans, State Inspector. Approved. Fire test, 110°. November 26, 1870." (The first initial of the inspector's name I could not decipher.) Now this oil, heated over the water bath, with the thermometer bulb three quarters of an inch below the surface, starting at 50°, and heated to 110° in fifteen minutes, flashed freely at 60°, took fire and continued to burn at 70°; and at 75° the flame would descend and ignite the mass with the light one inch above the surface. With the State Inspector's brand of approval at a fire test of 110°, for the oil to take fire at 70° seems to me an intolerable outrage, which I would gladly be instrumental in exposing and punishing. The degrees are, of course, Fahrenheit."

Whereupon the editor of the *Chemist* remarks: "It is possible that at the time Prof. Martin obtained his sample, the barrel did not contain the oil which the State Inspector approved."

Then why, asks the SCIENTIFIC AMERICAN, was the article sold or offered for sale? If dangerous oils like this can be peddled throughout the country, what is the use of inspection?

DEEP MINES.—The copper mine near Lake Superior was long supposed to be the deepest mine in the United States, being 1,300 feet in depth. But the Amador Quartz Mining Company, of Sutter Creek, Cal., has penetrated 1,350 feet "into the bowels of the earth, without let or hindrance." The Brazilian gold mine, owned by an English company, has been abandoned. The shaft was badly timbered, and water came in too fast to make it profitable in working. It was 1,890 feet deep.

THE ANCIENT BREWERS OF NEW YORK.

From the first number of a new publication called the *Brewers' Gazette, Distillers' Journal, and Malt and Hop Trades Review*, published by Curson & Mundy, 195 Fulton street, New York, we extract the following sketch of the early brewers of New York, which is full of interesting historical facts:

Several of the brewers in New Amsterdam were men of considerable note, and filled some of the highest civic offices in the community. Their establishments were chiefly situated in the vicinity of the Fort, within which the first was built. The street occupied by them was, from that circumstance, called the "Brouwer Straat," or the Brewers' street," and corresponded with the present Stone street, between Broad and Whitehall. It was one of the first streets occupied in the future commercial capital, and received its present name from being the first paved with stones, which was done by an ordinance made in the year 1657. One of the principal brewers in this locality was Isaac De Forcest, who came to the country in 1636, and in 1645 received a grant upon the above street, then one of the best in town. He was also the owner of a farm at Harlem, and of the "Old Kirk" or church on Pearl street, and for many years a magistrate. In acknowledgment of his services in improving the town, and in public office, he was privileged with "the great citizenship."

Jacob Wolfertsen Van Couwenhoven erected a large stone brewery on the north side of the same street, on land granted him also in 1645, at the corner of Stone and Broad streets. He was not successful in business, and entailed mortgages upon his property, of which, however, he held possession until his death in 1670. The same premises were occupied as a brewery subsequently by John Van Couwenhoven.

Peter, a younger brother of Jacob, just referred to, was also a prominent person at that day, and carried on business as a brewer and trader. He was six years a "schepen" of the city. He was unpopular, both with the English after they came in possession and with his Dutch neighbors. Having been arraigned on a charge of extortion, he refused to give bail, and was imprisoned and fined. He left the city, and resided awhile at Elizabethtown, New Jersey, of which he was one of the earliest settlers; but in 1665 was still a resident of the city, at the northwest corner of Pearl and Whitehall streets. His brewery at the head of the present Broad street became, in 1670, the property of Isaac Van Vleck, who, for the remainder of his life there, conducted a prosperous business in brewing. He was several years an alderman, and died in 1695.

The Bayards, also, Nicholas and Balthazar, step sons of Governor Stuyvesant, were among the most conspicuous and opulent citizens at that time. They were both engaged in the manufacture of beer. An extensive district of the city, long afterwards, and, to old residents of New York, still known as the "Bayard farm," was the property of their wealthy descendants. It extended along each side of Broadway, north of Canal street, for the distance of many blocks, and from the Bowery to beyond McDougal street, on the west side of the city.

Another wealthy burgomaster, who was one of the early brewers of the rising Dutch metropolis, was Oloff Stevenson Van Cortlandt. He came to the city in 1637, on military service, which he quit the same year for a civil office as commissary of cargoes, at a salary of thirty guilders ($12) per month. He resigned his office to the company in 1648, to engage in the brewing business. His premises were on "De Brouwer straat," now Stone, adjoining those of Isaac De Foreest, where his property was one of the first class, and valued, on the final cession of the city to the English, in 1674, at $30,000. He was an influential politician, and, in 1650, the president of the citizens' representatives, called the "Nine Men," who were opposed to the administration of the last governor, Stuyvesant, and were by him turned out of their pews in church, and their seats torn up. He had a valuable property on the west side of Broadway, adjacent to Cortlandt street, which still perpetuates his name. He held several prominent offices. His son, Stephanus, was the first native born mayor of New York, to which he was appointed at the age of thirty-four. Another son, Jacobus, was, like the last mentioned, a wealthy merchant and a mayor of the city

Jacob Kip, a son of one of the oldest settlers, in 1652 resigned the secretaryship of the city magistracy, to which he was appointed five years before, while quite a youth, on the first organization of the city, and engaged in the brewing business. He afterwards resigned it for mercantile pursuits. His property on Broad street, partly acquired in the business, and partly by marriage with the wealthy widow of Guleyn Verplank, was estimated in 1674, at $3,000. Daniel Verveelen, a brewer, who originally settled at Fort Orange, resided about this time on "De Prince straat," now Beaver, east of Broad. There are many of the name now in the State. On the same street lived also Jan Jansen Van Bresteede, a cooper, who was appointed in 1658 the marker of beer barrels, and in 1667 inspector of pipe staves. Jan Vinje is mentioned as a brewer in the town in 1653. He was one of the heirs to the property between Wall street and Maiden Lane, and extending from river to river, known as the Damen farm. In 1654, Thomas Hall, an Englishman, who had joined the New Englanders some years before in the attack upon the Dutch colony on the Delaware, where he was taken prisoner and sent to Manhattan, became the purchaser of a farm on what is now Beekman street. He there established a brewery, which, after his death, in 1670, with the farm, a large and valuable tract from Pearl street to Park Row, was purchased of his widow, by William Beekman. Beekman, who came to the province in 1647, and was the first of that name, carried on for many years the brewing business at the corner of Beekman and William streets, which conjointly still bear his name. Mr. Beekman was at an early age a schepen of the city, and held other municipal offices at different times. He was sub-director of the colony on the South river from 1658 to 1663, and after that was sheriff of Esopus. He was held in high esteem until his death in 1707, at the age of eighty-five. His property on the present Pearl street, between Franklin Square and Ann street, was in 1674 valued at $10,000. It was long known as Beekman's swamp, and is still spoken of among the leather manufacturers, to whose use it has been for a great while appropriated, as "the Swamp."

OAK GRAINING.

[Condensed from the Builder.]

There are several methods used for imitating oak, with various degrees of success. The most ancient of which we have any knowledge was done by painting the work with a graining color, and then making all the figures or markings with the end of a tallow candle; the result was that the graining color dried hard everywhere, except on those places touched by the tallow, which was then wiped off with a piece of flannel, leaving the marks of the clean ground color. Another plan was to mix a little dark color with sweet oil and beeswax, and put in with a pencil or fitch the color of the various markings, upon the bare ground color. The graining color was then mixed with beer, and spread over the work, and then flagged with a duster, or large flat tool made for the purpose. When this was dry, the marking color was washed off with turpentine. This system is in partial use even at this day.

The next great stride in oak graining seems to have been the natural out-growth from this last process, and is called "spirit-color graining." When well and properly done it is a useful and cleanly process, having this advantage over any other method, *i.e.*, that work done with it may be grained and varnished in the same day, which, under certain circumstances and for certain work, is very valuable, especially where, as in offices, etc., unnecessary interruption of business has to be avoided. This process is carried out as follows: To mix the graining color, grind a quantity of the best washed whiting in turpentine; add such a proportion of either burnt sienna, Oxford ocher, burnt umber, raw umber, or part of one and part of another, according to the color required, as will stain the whiting to the required depth of color; then add sufficient turpentine varnish to bind or fasten the color when thinned to a working consistency with turpentine, which may be best ascertained by trial before commencing any important work. The color is then spread evenly over the surface, and strippled or streaked with a duster or flat brush; it is now combed quickly (in the manner hereinafter described). If this be not done quickly, the color sets or dries, and when once set the combing cannot afterwards be done. The color dries quite dead. When it has stood a short time it may then be figured or marked, in imitation of the marks seen in the real oak, thus:—Dissolve Scotch soda in water—let it be tolerably strong—add a little burnt sienna, ground in water. Now take a flat fitch (hog-hair), dip it into the solution of soda, and thus mark out or put in any figure desirable, taking care not to use it too freely, or else it will run and make marks which are not required; it must be borne in mind that wherever the soda touches there will be a mark. When the work is all figured, the whole must be well washed with a sponge and plenty of clean water, which will clear off the soda, and wherever it has touched, the graining color will be destroyed, and will wash off, leaving the figures clear and bright. The work must then be brushed over with weak beer and water, in the proportions of half beer and half water, and then overgrained in the usual manner. A door may thus be grained and varnished in a couple of hours' time. The solution of soda is sometimes dispensed with, and turpentine is used instead. The veining fitch is dipped into turps, stained so as to show the marks, which are wiped off again before they have had time to dry, using a flannel rag for that purpose. Wherever the turpentine touches the spirit color it immediately softens the turpentine varnish, which may then be wiped off, but only while it is wet; and as it of course dries very soon, the work requires to be quickly done, or else it is labor lost. This is not so cleanly in using as the soda, but good work may be done with it. The heart or sap of oak may be admirably imitated on this system, especially upon molded surfaces. The heart must be marked in with the fitch or a sable pencil and turpentine, as before described, and, while it is wet, must be brushed or softened all one way, that is, in the direction in which the sap runs—the direction of its growth. If this be done well, the light and dark edges of the sap of the real wood may be very closely imitated.

But the most important and best system of graining oak is the oil-color process. It must be understoood that oak has two distinct characteristics. The first is the grain of the wood, which is formed by the pores, and which always runs the length way of the plank, and, in fact, of the tree also, and this is fine or coarse, as the case may be; the other is technically called "the figure"—the dapple, the veining, and the lights of the oak. These markings, almost in every case, run across the grain, and, as a rule, have a silvery reflection, and stand out lighter and brighter than the grain, and sometimes they have a light silvery edge and a dark center. Of course, both the grain and the markings are different in different descriptions of oak. In the English oak the grain and the veining, or figure, are much finer and closer than in the foreign oak. The Dantzic oak, for instance, is exceedingly coarse or open in its grain or pores, and the "lights," or figure, are, as a rule, in broad or thick lumps, without much grace or beauty of form; while the figure in English oak is arranged or flows in graduated curves, having a beauty peculiarly its own. The grain and the markings require different methods of working, and there is no method yet invented which does this so effectively and so well as the oil process.

New work should be well dusted before being primed. After the first coat is dry, it should be rubbed down with sandpaper and stopped with good sound putty. Three coats should then be put on and the work sandpapered between each coat; except this be done, no good work can result. The finishing coat should be mixed with three parts of oil to one of turps. The color for light or new oak, commonly called wainscot, should be a light creamy buff, made with Oxford ocher and white, and a little vermilion or Venetian red. Some grainers like a white ground for this very light oak, but it has a rawness of look which is not at all pleasant to look upon.

For a middle shade of oak the color should be stained with Oxford ocher, Venetian red, and a little burnt umber; and for dark oak, with burnt umber, Venetian red, and a little orange chrome. These may all be modified by admixture with black, in a degree according to whether the oak when finished is to be warm or cool in tone. And here we may note that the color of the ground is of vital importance to the effect of the work when finished. Many persons don't care much about the ground color so that it is light enough, as they depend upon the glazing color to bring it up to the required shade. This we are quite certain is a mistake, for if two panels be grained, one on a white or nearly white ground, and the other on a rich colored ground, the former cannot by any amount of glazing be brought to the same richness of color as the latter; therefore it is the wisest plan to work upon ground colors which are of the same tone of color, or nearly so, as the work is intended to be finished. The contrast also between the graining color and the ground color should never be violent. When it is so, the work has a staring vulgarity about it very undesirable. The "figure" or markings stand out so prominently and so positively that all flatness and repose is destroyed. This is a very common fault with grainers, and one which should be avoided. Grainers of this class are very fond of bright chrome-yellow ground, and of glazing their work with burnt sienna, thus making it "foxy," and, as a matter of course, ugly and vulgar.

DYERS' RECIPES.

From Haserick's Secrets of Dyeing.

INDIGO BLUE TOPPED, FOR HOSIERY.—100 pounds of wool are colored with 4 pounds of Guatemala or 8 pounds of Bengal indigo, in the woad or soda vat; then boil in a kettle a few minutes 5 pounds of cudbear or 8 pounds of orchil paste; add one pound of soda, or, better, one pail of urine; then cool the dye to about 170° Fah., and enter the wool. Handle well for about twenty minutes; take it out, and cool, rinse, and dry. It is all the same if the cudbear be put in before or after the indigo. Three ounces of aniline purple dissolved in one half pint of alcohol can be used instead of the cudbear. It produces a very pretty shade, but it ought never to be used for mixed goods, which have to be bleached, as it runs into the white; also the cudbear disappears in the sulphur.

DARK BLUE FOR BROADCLOTH IN THE WOOL.—This is colored in a healthy woad vat; the first dip is handled well and slow for one hour in the net, then taken out, aired, and the vat stirred again; in two hours it can be dipped again for half an hour, and so often taken through until it has acquired the right shade. The vat ought to be strong enough in indigo to color it dark enough in three dips. About 10 pounds of good indigo is reckoned to 100 pounds of wool; clear indigo blue does not require anything more, but if taken through a warm bath containing two pounds of blue vitriol, the color stands better in fulling, and is faster; after which it is rinsed, switched, and dried. The dark blue generally found in the market is topped with 15 pounds of camwood or 20 pounds of red sanders; the latter are boiled on the colored wool, as the indigo required for such dark colors would make it very expensive.

DARK BLUE TOPPED WITH LOGWOOD.—Give it a dip first in the blue vat, then rinse: then boil the wool for one hour in a kettle containing 10 pounds of alum, 2 pounds of half refined tartar, and 1½ pounds of blue vitriol; after which take it out, cool, and make fresh water. Add from 5 to 10 pounds of logwood, according to the shade required, and the quality of the logwood; let it boil in a bag or otherwise, cool the kettle to 170° Fah., enter the wool and handle slowly; in one hour it can be cooled, rinsed, and switched for drying. This does not require any alkali in shading the wool, as the soap will do this in fulling. If cloth be colored this blue, some pearlash or urine may be used to accomplish it; but then the kettle ought to be cooled to 136° Fah. The goods require good scouring, otherwise they will crock.

INDIGO BLUE ON CLOTH, PART LOGWOOD.—100 pounds of cloth. Color the cloth first by one or more dips in the vat of indigo blue, and rinse it well; then boil it in a solution of 20 pounds of alum, 2 pounds of half refined tartar, and 5 pounds of mordant for two hours; then take it out and cool. In fresh water boil 10 pounds of good logwood for half an hour in a bag or otherwise; cool off the kettle to 170° Fah. before entering: handle well over a reel; let it boil for half an hour, then take it out, cool, and rinse. This is a very fine blue, but not so permanent for wear.

Improvement in Printers' Quoins.

This quoin, now generally used in France, is rapidly gaining favor in this country. It is really a great improvement, and we are now using it in our office with much satisfaction.

It has the advantages of durability, saving in wear and tear of chases, so often broken and sprung by the use of the old quoins, entire freedom from shrinkage, much greater rapidity in locking up forms, and greater security, as a form once locked may stand any length of time and remain as tight as when first locked.

The pressure is equalized on all parts of the chase, and thus without undue strain all the pieces in the form are securely held without the use of beveled furniture.

The pressure is obtained by means of screws, actuated by triple or quintuple worm gearing, as shown, the central worm being turned by a hand key. The pressure thus obtained is very great. Various sizes are made, adapted to all sorts of newspaper, book, and job work.

This device was patented in the United States August 10, 1869. For further particulars address, F. Dorrity, 240 East Thirty-second st., New York.

Benefits of Science.

The practical view of agriculture cannot be more clearly or profoundly conceived than it was by the North American chief, whose speech on the subject is reported by Crêvecœur. The chief, in recommending agriculture to his tribe, the Mississippian Indians, said: "Do you not see that the whites live on corn, but we on flesh? that the flesh requires more than thirty moons to grow, and is often scarce? that every one of the wonderful seeds which they scatter on the soil returns more than an hundred fold? that the flesh has four legs to run away, and we only two to catch it; that the seeds remain and grow where the white man sows them? that the winter, which for us is the season for laborious hunts, is to them a time of rest?

It is for those reasons that they have so many children, and live longer than we do. I say, then, to every one that hears me, before the trees above our huts shall have died of age; before the maples of the valley cease to yield us sugar, the race of the sowers of corn will have extirpated the race of flesh eaters, unless the hunters re- solve also to sow." In his difficult and laborious life of the chase, the Indian consumes in his limbs a large sum of force; but the effect produced is very trifling, and bears no proportion to the expense. Cultivation is the economy of force.

Science teaches us the simplest means of obtaining the greatest effect with the smallest expenditure of power, and, with given means, to produce a maximum of force. The unprofitable exertion of power, the waste of force in agriculture, in other branches of industry, in science, or in social economy, is characteristic of the want of true civilization.

Breaking of Car Axles.

W. Bridges Adams, in a paper published in the Journal of the Society of Arts, says that the cause of the breakage of railway axles is to be found in the fact that they are strained beyond their powers, not by the load, but by imperfect structure of the vehicle they are attached to—imperfect, possibly, originally, but commonly by violence in use. "The running is wringing the neck of the axle."

With a view to lessen lateral friction of the wheel flanges as much as possible, it has been customary to keep the axles as near as possible together. This, if the bodies be long, involves "hogging," and oscillation, with a bad distribution of the load. Other things being equal, the nearer the axles are to the wagon end, the steadier they will be; but then flange friction increases with the length of wheel base, and a remedy must be provided for this.

Supposing that a train of wagons were built perfectly true at the outset, for a straight line, the multitude of longitudinal shocks would soon set the wheels out of truth, and so the question arises, whether it be possible so to construct them, that diagonal shocks to the frame, giving a permanent set, shall not affect the true running of the wheels; and next, whether wagons may not be so constructed as to dispense with the loose coupling, which is a material source of breakage to couplings, and displacement of the wagon frames? We think it is. Desirable as it is to point out the causes of the defects, it is still more useful to point out the remedy.

Value of Patents on Small Articles.

A good illustration of the value of patents on small articles in universal demand, is found in Miles' patent double-pointed tacks, designed for putting down carpets, oilcloths, matting, etc., and for hanging curtains, etc. Two patents have been obtained upon this improvement, and although recently introduced, the manufacturers are doing a large business. The tacks are made on the principle of the staple. The edge of a carpet nailed by them may be stripped up without the least danger of tearing the fabric. They are easy to extract when driven, as they have no heads to break off. They are a decided improvement on the old style of carpet tacks, and may be found advertised in another column.

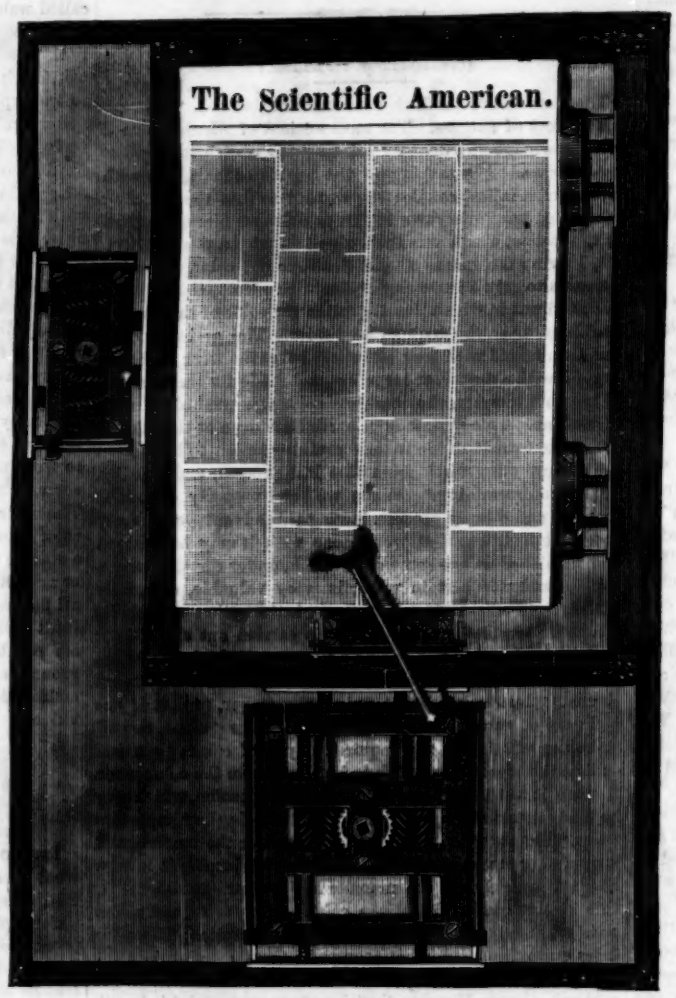
A NOBLE ACT.—Mr. A. T. Stewart, the well-known merchant of this city, is about to send 5,000 barrels of flour, on his own account, to relieve the suffering French. Mr. Stewart's example is a noble one, and will entitle him to rank as a benefactor to the suffering poor.

PYROMETER.

The pyrometer, or "heat measurer," is an instrument for indicating temperatures by the expansion of metals.

While, for many purposes, the mercurial thermometer is undoubtedly useful and indispensable, still, where such an instrument is subject to careless handling, or when, from the nature of things, the indications should be clearly read, and also when temperatures above 500 degrees are to be measured, it is evident that some other arrangement must be adopted.

Advantage being taken of the uniform expansion and contraction of metals, from heat and cold, an instrument is here



DORRITY'S PATENT QUOIN.

shown, in which the longitudinal and differential expansion of two metal tubes is, by suitable mechanism, made to register, in degrees of any desired scale, on a dial similar to a steam gage. This pyrometer consists of a seamless drawn brass tube, inclosing a turned iron tube, and both are screwed into a socket at the bottom. The upper end of the iron tube is closed by a rod screwed into its bore, while the brass tube is secured to the case of the instrument. The iron tube being open throughout, and both tubes being in close contact, it follows that when they are immersed in the fluid, gas, or molten metal to be tested, the brass tube expands more than the iron, and carries it down with it, as they are united at their lower ends. This motion, which is uniform, is, by means of a toothed bell-crank sector within the case, and a small pinion on the pointer shaft, greatly multiplied, moving the pointer around the dial in any desired ratio to the motion of the inner tube.

This arrangement of the metals is claimed to insure their becoming uniformly heated, as it is highly important that both tubes should acquire the temperature of the substances tested as speedily as possible.

For showing the temperature of oil stills, gas retorts, steam digesters of all kinds, india-rubber vulcanizers, vats of hot liquids (as in dye works, breweries, etc.), as well as for superheated steam, this pyrometer will be found convenient, as it is not easily damaged (being all of metal) and its indications are as easily read as those of a steam gage.

In cases where the tubes cannot be inserted, for want of room, they may be enclosed within a larger one, the end of which is screwed into the vessel containing the substance to be tested.

This pyrometer is used as a steam gage by attaching th tubes to the back, instead of to the bottom, of the case, and screwing the instrument into the head of the boiler, the dial being then vertical. The expansion of the tubes will thus always show the true pressure in the boiler, the dial being in that case graduated in pounds.

These pyrometers are graduated, after the tubes have been thoroughly annealed, by placing each instrument in a freezing mixture, then in boiling water, and lastly in high pressure of steam, from which points the length of the degree is determined.

They are manufactured in several styles, with tubes at the back or bottom of the case, and of any length between one and four feet, as may be desired.

Application has been made for a patent on this improvement, and the instruments are manufactured by the inventor, Henry W. Bulkley, mechanical engineer, 98 Liberty street, New York, who may be addressed for further information.

Exploding Charges by Electricity.

Franklin, in 1751, and Priestly, in 1761, suggested the possibility of applying the electric spark for the ignition of gunpowder charges; but electricity was not practically applied until about thirty years ago, by the French military engineers, since which its use has become general. It was employed to ignite the great blasts that destroyed the Round Cliff at Dover, and to remove the wreck of the Royal George, and has been largely used in heavy blasting with powder and nitro-glycerine in California, and for exploding torpedoes under water.

The variety of contrivances is very great. Many exploders have been devised to act either by heating a piece of thin wire, introduced in the circuit of a battery and placed in the charge, or by the passage of a spark produced by an electromagnetic machine, or Ritchie coil, through a sensitive explosive compound, thus causing a local explosion sufficient to ignite the whole charge.

Among those who have given great attention to this subject, Baron Von Ebner, of the Austrian military engineers, and Mr. Abel, of the British war department, who has devised one of the best exploders known, may be specially mentioned. A spark generated by revolving magnets is made to pass through a mixture of subphosphide and subsulphide of copper and chlorate of potash—materials of high conducting power and extremely sensitive to the spark. One of the great difficulties in the way of making such exploders is the liability of the materials to be merely thrown aside, and not exploded, by the passage of the spark.

In the United States, inventors have been active in devising different forms of apparatus for igniting explosives. They all depend upon either the direct passage of a spark or the heating up of an imperfect conductor, immersed in an explosive mixture. This mixture and the arrangement of wires are inclosed in a small cartridge of paper or wood, which can be readily placed in the midst of the powder, in the hole to be exploded. Mr. Stowell patented, in 1862, a peculiar form of cartridge, containing the ends of the conducting wires and a strip of platina. Beardslee, in 1863 patented a very simple mode of making an imperfect conductor between the ends of two wires, by drawing a pencil mark of graphite upon the surface of a piece of dry wood. Mowbray, in July, 1869, patented an improved electrical fuse for exploding charges of nitro-glycerin. It consists of a small cartridge of powder, in the top of which is placed a small quantity of a composition, like that used by Mr. Abel, made of sulphide of copper, 9 parts; subphosphide of copper, 3 parts; chlorate of potash, 3 parts; the whole intimately mixed. The ends of the wires are immersed in this mixture. It is designed especially to be inserted in cans of nitro-glycerin, to be exploded in oil wells.

The dealers in the new explosive compounds, such as nitro glycerin, dynamite, and dualin, furnish exploders especially designed for the several preparations. These various exploders may be fired either by the voltaic current, or by a spark from a suitable electrical machine, or the Page coil.—*Mining Machinery.*

THE AMERICAN BIRD TRADE.—The bird trade in America seems to be in a flourishing condition. Over 40,000 canaries are brought in every year, and probably 10,000 more are raised in this country for the purpose of sale. The number of bullfinches, goldfinches, thrushes, robins, and larks annually imported rise as high as 500 or 600 for each variety. There are fully 3,000 Java sparrows brought to the United States by vessels from that region, and fully as many parrots are yearly sold in this city alone. Waxbills and other minute varieties are scarce, and seldom arrive in quantities of more than 100 or 200 each year. Parroquets and love birds from Australia follow parrots in their relative importance. In native birds there is no reliable data to go upon. It is roughly estimated that about 10,000 mocking birds find their way from the wild nest to the cage each succeeding year.

RHEEA FIBER.—Notwithstanding the report that a number of machines for clearing rheea fiber had been sent in to the Indian Government in reply to the announcement published last year, none would seem to have been successful, from the fact of the time for competing for the prize of £5,000 having been extended for another year.

PERPETUAL MOTION.

NUMBER XI.

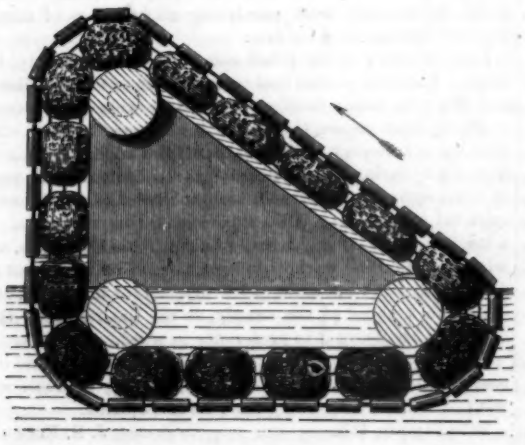
No less a person than Sir William Congreve, M. P., and inventor of the famous Congreve rocket, figured in his time as a believer in, disputant upon, and inventor of a perpetual motion. So sure was he that he had discovered the long sought principle upon which self-moving machines could be constructed, that he patented his device, although we believe he never claimed to have succeeded in getting it to work. Nevertheless, he obstinately maintained that it would work, in spite of the mathematical demonstrations, of the absurdity of his views, made by several eminent mathematicians.

Fig. 28 shows this device. As will be seen, it is based on a principle hitherto not mentioned in this series of articles, viz: the power of capillary attraction.

Three horizontal rollers are fixed in a frame; an endless band of sponge runs round these rollers, and carries on the outside an endless chain of weights, surrounding the band of sponge, and attached to it, so that they must move together; every part of this band and chain being so accurately uniform in weight that the perpendicular side will, in all positions of the band and chain, be in equilibrium with the hypothenuse, on the principle of the inclined plane. Now, if the frame in which these rollers are fixed, be placed in a cistern of water, having its lower part immersed therein, so that the water's edge cuts the upper part of the rollers, then, if the weight and quantity of the endless chain be duly proportioned to the thickness and breadth of the band of sponge, the band and chain will, on the water in the cistern being brought to the proper level, begin to move round the rollers in the direction of the arrow, by the force of capillary attraction, and will continue so to move.

On the perpendicular side of the triangle, the weights hanging perpendicularly alongside the band of sponge, the band is not compressed by them; and its pores being left open, the water, at the point where the band meets its surface, will rise to a certain hight above its level, and thereby create a load, which load will not exist on the ascending side, because on this side the chain of weights compresses the band at the water's edge, and squeezes out any water that may have previously accumulated in it; so that the band rises in a dry state, the weight of the chain having been so proportioned to the breadth and thickness of the band as to be sufficient to produce this effect. The load therefore, on the descending side, not being opposed by any similar load on the ascending side, and *the equilibrium of the other parts not being disturbed by the alternate expansion and compression of the sponge*, the band will begin to move in the direction; and as it moves downwards, the accumulation of water will continue to rise, and thereby carry on a constant motion, provided the load be sufficient to overcome the friction on the rollers.

FIG. 28.



Now, to ascertain the quantity of this load in any particular machine, it must be stated that it is found by experiment that the water will rise in a fine sponge about an inch above its level; if, therefore, the band and sponge be one foot thick and six feet broad, the area of its horizontal section in contact with the water would be 864 square inches, and the weight of the accumulation of water raised by the capillary attraction being one inch rise upon 864 square inches, would be 30 lbs., which, it is conceived, would be much more than equivalent to the friction of the rollers.

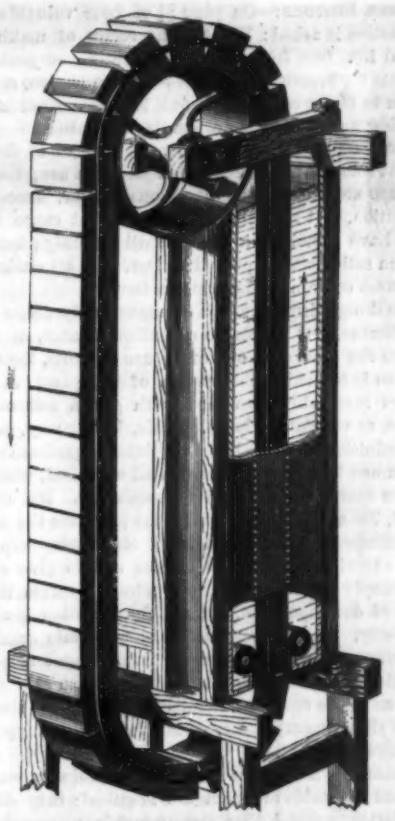
Now, the fallacy in this plausible argument is found in the words italicised. The equilibrium of the parts of the chain *is* disturbed at the moment the chain moves downward to compress the ascending file of sponges, and just enough disturbed to counterbalance the increase of weight on the perpendicular side. It is somewhat astonishing that a man of Sir William Congreve's ability, should not have seen this at once, and still more astonishing that he should have disputed it when pointed out to him, which he did vehemently. Writing upon this subject, he says:

"For my own part, not being able to see any reason why the machine should not act, I confess that my faith is sufficiently strong to have induced me to take out a patent, and I am determined to use my best exertions to give mankind the benefit of this discovery, should it turn out, as I sincerely believe it will, a source of perpetual power without expense."

Fig. 29 is a diagram sent us by Mr. Wm. B. Cooper, of Philadelphia, who writes as follows in regard to it:

"Having seen in your issue of 7th Jan., a diagram of an attempt at perpetual motion, by H. Leonhart, I send you the enclosed diagram and description, which appears to me to correct the errors in his. The diagram represents an upright tank, through which passes a number of floats connected by a band of elastic rubber attached to their ends, leaving just enough space between them to secure action on each by the water. They are each of the same weight as an equal bulk of water at the surface, therefore the upper one in the tank

FIG. 29.



has no comparative weight. The next lower one has a unit of upward force, equal to the condensation of its bulk of water, and so on, each adding a unit to the upward tendency, until we come to the last, the pressure on which is altogether downward to the amount of the entire column of water; but we already have a number of opposing upward forces, and when we look on the other side and see the thirteen active weights, it seems clear that there will be a large surplus weight, over and above the opposing weight and the friction of the rollers and upper wheel.

"Of course mercury or any other liquid could be substituted in place of water.

"If you can, by the enclosed rough diagram and description, comprehend my meaning, I would consider it a special favor if you would point out the error, if any."

The mistake of this inventor is in supposing the upward pressure of the floats, added to the weight of the floats outside the tank, will more than equal the weight of a water column having a base equal to the lower side of one of the floats, and a hight equal to the depth of the tank. If the floats be made of material more compressible than water, they would tend to sink rather than rise in the tank, but if made of material less compressible, the amount of upward face which could be obtained by their compression would be far less than the weight of water in the interstices between the floats. The downward effective pressure on the lower float in the tank would be the difference between this buoyancy and the weight of water in the interstices between the floats. The weight of the floats outside the tank is exactly balanced by the downward pressure of a bulk of water equal to that displaced by the floats in the tank, therefore if any motion should take place at all, it would be in an opposite direction from that expected, and would only continue till enough water had passed out of the bottom of the tank to bring the parts of the machine in exact balance.

W. MATTIEU WILLIAMS ON THE BESSEMER PROCESS.

From Nature.

In the first place, the pig iron is melted in a suitable furnace, usually in that form of furnace known as the "cupola." The melted iron is run from this by means of movable troughs into the "converter," which is a pear-shaped spouted vessel, lined with fire-clay, "ganister," or other refractory substance.

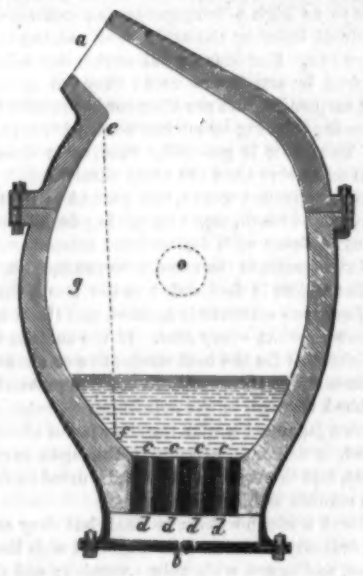
This pear-shaped vessel is truncated at the lower end, and thus a flat circular bottom is formed. This bottom, which is readily detached and renewable, is fitted with longitudinally perforated fire clay cylinders, shown in section at *cd cd cd cd*, each perforation or clay tube being about one half or three quarters of an inch in diameter, and all communicating with the space, *d d*, into which opens the blast tube from a powerful blowing engine. The number of these blast holes varies from fifty or sixty to a hundred or more, according to the size of the converter.

The converter is mounted on trunnions so arranged that it may turn on a transverse axis crossing about the middle of the vessel, as shown by the dotted circle, *e*. The turning is effected by hydraulic machinery, controlled by levers readily worked by a man who stands on a platform in full view of the converter. In order to receive the charge of melted iron, the converter (the lining of which has been previously raised to a bright-red heat) is turned over so that the dotted line, *e f*, becomes horizontal, and corresponds to the surface of a full charge. The belly, *g*, of the converter is so curved that it shall in this position retain the whole charge without any of it reaching the blast holes at *f*, or the mouth at *e*, and yet allow the whole charge to be readily "teemed" by turning the converter a little further down.

When the full charge is thus received in the belly of the converter, the blast is turned on, after which the converter is turned to the upright position, as shown in the figure, and the melted metal then stands directly over the perforated bottom. All the fluid metal above the openings is now resting upon a bed of air, and is only prevented from falling through by the blast being maintained at a pressure exceeding the falling force of the column of liquid above it. It would fall through these orifices into the blast-way and do serious mischief should the blast be stopped or slackened for an instant, or should the converter be turned upright or overcharged, before the commencement of the blast. An accident of this kind but rarely happens, though it is by no means an unknown casualty.

The "blow," as it is termed, now commences; the hundred streams of air tear through the pool of melted iron, and a huge flame roars furiously from the mouth of the converter. At irregular intervals magnificent cascades of brilliant coruscating sparks are belched forth, and the dazzling spray as it dashes against the walls of the flame shaft rebounds with redoubled splendor, each glowing globule being shattered by the shock, and bursting into rescintillating fragments. The loud-bellowing blast roars on monotonously, but the flame becomes brighter and brighter continuously, and grows in length and breadth as it increases in brilliancy, until at the end of about ten minutes it attains its maximum, when its splendor is painful to the eye, and yet so fascinating that few who see it for the first time can turn their dazzled eyes away. The spark eruptions still burst upwards from time to time, and still dash against the brickwork and the ground, and still reverberate in fiery splinters, but their appearance has changed. They are now no longer red hot, or yellow hot, or white hot, but have a curious purple luminosity different from anything one has ever seen before. If it be day time, and the sun shining, the sunlight out of doors has a sickened partial-eclipse aspect when viewed directly after gazing at the flame, and at night the ordinary gas lights appear red and smoky.

After five or ten minutes continuance of this maximum splendor, the flame is seen to contract somewhat, and presently the ponderous vessel turns a very deliberate summersault, the flame disappears, but the uninitiated spectator is startled



by a new display; for as the converter rolls smoothly over, it disgorges a continuous stream of sparks which its rotation spreads out in a fan-shaped volley, extending from end to end of the building, and reaching the roof, descends in a broad sheet of fiery hail. This is the transformation scene which concludes the first part of the performance; for now the dazzle of the flame and the roar of the blast ceases, and a general lull intervenes.

The trough from the cupola is now swung round to the mouth of the converter, a red glow is seen to creep along it, and starry sparks dance above as it advances. This is the spiegeleisen coming from its cupola by the same path as conducted the main charge. The spectator should now change his position, and, if possible, find a standing place from which he may look into the mouth of the converter. At first he will distinguish nothing but a yellow glare, but by steadily fixing his gaze, he will presently, and rather suddenly, distinguish the surface and limits of the pool of melted metal. He will see that as the spiegeleisen pours into it, a furious ebullition takes place. At the same time a great mass of pale blue flame issues from the mouth of the converter, but with a quiet, leisurely waving, that contrasts curiously with the previous roaring jet of white flame. This flame has but very little intrinsic luminosity, yet at night it lights up all the surrounding objects with a singular brilliancy, a sort of

exaggerated theatrical moonlight effect, which is the most remarkable to a spectator outside, who, on a misty night, sees the long streams of ghostly light pouring through every opening of the building in pallid beams that, under favorable conditions, may be traced for above a quarter of a mile. I have seen them projected in bright disks upon the face of low clouds, and visible through the whole of their intermediate course.

When the flow of spiegeleisen has ceased, the trough is moved aside and a large counterpoised arm bearing the "ladle" is swung round upon a hydraulic piston, which forms at the same time its axis and lifter. The ladle, a large lined iron pot, is adjusted under the mouth of the converter, which is now tilted a little more, till the melted metal is poured out in a thick brilliant white-hot stream, accompanied from time to time with great slabs of cinder of a darker color, which float upon its surface as it pours, and form a thick scum covering the contents of the ladle. When all the fluid metal is poured into the ladle, the converter is tilted over till completely inverted, and the remaining viscous mass of cinder drops out in a glowing heap upon the floor.

During these proceedings a set of workmen have been preparing the molds in which the ingots of steel are to be cast. These molds are of cast iron, nearly cylindrical, being larger at bottom than top, and open at both ends. They have lugs or handles at top by which they are lifted. They stand upon a tile, and are well packed round the bottom with sand to prevent the outflow of the melted steel. While the blow was proceeding these were arranged in an arc of a circle whose radius exactly corresponds with the length of the arm bearing the ladle.

The ladle is now swung round and adjusted till it stands directly over the first of this row of iron vases, and a plug is released, by which a hole in the bottom of the ladle is opened. Through this the steel is poured into the ingot. When the first is filled, the plug is closed, the ladle swung round to the second mold, and so on, till all the steel is thus cast into ingots, the size of which varies with the kind of work for which the steel is required. A thin steel plate is placed on the top of each casting immediately the mold is filled, and over this a bed of sand is placed, and speedily and firmly pressed down.

As soon as the ingots have solidified, and while they are still glowing, the molds are lifted off them by means of a hydraulic crane, and afterwards the ingots are picked up by tongs attached to the same machinery, and are carted away, all red hot, to the hammer shops, where they are thumped and rolled or otherwise tortured into their required forms of rails, tires, and plates.

Japanning on Metal, Wood, and Paper.

Japanning on metal, wood, and paper is executed in much the same manner as similar works in spirit or oil varnishes, except that every coat of color or varnish is dried by placing the object in an oven or chamber called a stove, heated by fines to as high a temperature as can safely be employed without injuring the articles, or causing the varnish to blister or run. For ornamental works, the colors ordinarily employed by artists are used; they are ground in linseed oil or turpentine, and are afterwards brought to a proper consistence for working by mixing them with copal or anime varnish. The latter is generally used, as it dries quicker, and is less expensive than the copal varnish.

For black japanned works, the ground is first prepared with a coating of black, made by mixing drop ivory black to a proper consistence with dark-colored anime varnish, as this gives a blacker surface than would be produced by the japan alone. The object is then dried in the stove, three or four coats of japan are afterwards applied, and the work is dried in the stove between every coat. If the surface is required to be polished, as for the best works, five or six coats of japan are necessary, to give sufficient body to prevent the japan being rubbed through in the polishing.

For brown japanned works, the clear japan alone is used as the ground, or umber is mixed with the japan to give the required tint, and the work is afterwards dried in the oven, in the same manner as black japan.

For colored works no japan is used, but they are painted with the ordinary painters' colors, ground with linseed oil or turpentine, and mixed with anime varnish; and the work is dried in the oven in the same manner as the black japan.

To protect the colors, and give brilliancy and durability to the surface, the work is afterwards varnished with copal or anime varnish, made without driers. Two or three coats of varnish suffice for ordinary works, and five or six for the best works that are polished. Very pale varnish is of course required for light colors.

Ornamental devices are painted on the objects in the usual manner, after the general color of the ground has been laid on. The colors are dried in the stove, and the work is finally varnished and polished just the same as plain colors, but more carefully.

Metal works require no other preparation than cleaning with turpentine, to free them from grease or oil, unless the latter should happen to be linseed oil, in which case the cleaning is generally dispensed with, and the articles are placed in the stove and heated until the oil is baked quite hard.

Wood that is intended to be used for the best japanned work, requires to be thoroughly well dried before it is made up, or otherwise it will be subject to all the evils of shrinking, warping, and splitting, when exposed to the heat of the stove. To avoid these evils, the wood, after having been well seasoned in the usual manner, by exposure to the air, is sawn out nearly to the required forms, and baked for several days in the japanner's stove, the heat of which is gradually increased; and the wood is afterwards worked up into chairs, tables, trays, and similar articles, which are afterwards again exposed to the heat of the stove, and any cracks or other imperfections, that may be thus rendered apparent, are carefully stopped with putty, or white lead, before the japanning is commenced.—*Handbook for the Artisan, Mechanic and Engineer.*

Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

The Destructive Action of Albumen--Its Remedy

MESSRS. EDITORS:—On page 81 of your valuable journal, the question is asked: What is the secret of making black (carbon) ink free from any disintegrating or perishing ingredients? Permit me to answer the question, not only in relation to black carbon ink, but to many other materials that labor under the same or similar difficulties.

The carbon in the black ink is not subject to decomposition, but some of the ingredients added to it are; these ingredients are not free from albuminous matter, hence the decomposition. It certainly is singular that cause and cure should have remained a secret until recently; but the fact has been satisfactorily proved at last, that all crude organic substances contain albuminous matter.

Animal organism takes the albumen ready formed into its nourishment, but vegetable organisms cannot, of itself, assimilate the albumen; out of its constituents, the vegetable albumen is formed in the system of the plant, in which it appears invariably combined with glutin and other substances, as vegetable gluten. (This, by the way, may be the true definition of animal and vegetable organism.)

Albumen is a necessary part in all organism, which cannot form or exist without it or its constituents. But life having ceased, the nitrogenous albuminous parts are the true basis of decomposition under ordinary elementary exposure, by their superior tendency to oxidize and to give support to microscopic organism, whose presence involves the several states of decomposition, termed fermentation, putrefaction, and decay. As the presence of microdermic organism and the albumen required for its nourishment are necessary conditions for elementary decomposition, an easy conclusion leads us to the essential condition of stability: the removal of the albuminous matter, which forms the support of destructive organism.

Albumen is a colorless substance, soluble in water. Animal and vegetable albumen are identical; they differ in the association in which they appear, and in the superior tenacity of the vegetable compound to maintain the association.

An erroneous statement, which we meet in all books on the subject, requires correction, as it leads to the incorrect conclusion that albumen may be removed, from liquids, in a coagulated state by mere heating. Crude animal albumen readily coagulates at about 160° Fah.; the erroneous conclusion is drawn that *all* albumen thus coagulates. Vegetable albumen in the form of gluten requires other conditions than mere heat for a separation preliminary to a coagulation. Simply boiling heat, continued for many hours, only produces a partial removal of the albumen from vegetable juices or extracts; for instance, saccharine or oleaginous juices of any kind, such as beerwort, the saccharine extract from malt. However, other agencies assist the coagulation of the albuminous parts at lower temperatures, even little above 32° Fah.

The very nature of the albuminous compounds, and that they form the basis of all elementary destruction of organic substances, being unrecognized, all operations with these substances remained something like empirical attempts to accomplish a resistance against unknown agencies, and the manufacturing operations improved slowly. A recognition of the all-governing principle in organic matter permits the deduction of the proper mode of treatment.

The agent, by which the albumen can be separated and removed from any crude organic substance, without injury to the other compounds, or by which it can be retained in an innocuous condition, is the air we breathe.

Intelligently applied, it enables us to meet all the difficulties successfully. Rapid passage of air through liquids or over an organic substance produces traces of ozone, that is, oxygen in an excited, highly active condition. (Ozone is produced in large quantity by electric action, by blowing of air through a flame, etc.) Want of ozone in air is destructive to dead organic matter, the slow access or quiescent contact of air favors putrefaction; rapidly-moving (ozonized) air, on the contrary, destroys the organism which causes putrefaction. It seems to act also essentially upon the albuminous matter, separating it from its compounds, and, by coagulating it, to render it innocuous. At a temperature favorable to an alcoholic or curing fermentation, this process is at the same time improved, by invigorating the mycoderms, to whose flourishing condition the fermentation is due. As soon, however, as the albuminous parts are entirely coagulated, the mycodermic action must necessarily cease for want of the required aliment, the soluble albumen.

Every part of a fluid, or of solids immersed in fluids, is uniformly acted upon, by impelling the active gas in a divided state through the fluid, in which a mechanical commotion with the chemical action is produced; or, the air or gases are made to circulate, freely and rapidly, about solid substances whose preservation is intended.

Mycodermic life is suppressed in vegetable matter, at a temperature above about 135°. The albuminous parts may thus be eliminated from vegetable fluids, with exclusion of fermentation, by currents of air through the fluid, heated above 135°; the action is more vigorous at a still higher temperature, and the action, of the atmospheric oxygen or other gases, greatly intensified at a higher than the ordinary atmospheric pressure.

No chemical can prove of universal use for purification; what improves one injures other organic substances, while air, the principal source of all organism, benefits all alike. The practical application, in the manner explained, of the universal principle, is termed, by the Californian discoverer of both, the d'Heureuse's Patent Air Treatment, and the fact that the application is patented cannot detract from the truth of the principle involved. It appears to be of universal applicability in the manufacture of sugars, oils, glue, gums, wine, cider, beer, spirits, and in the preservation of meat, produce, hides, etc. It certainly is simple, effectual, and subject to the control and comprehension of the most ordinary intellect.

The ingredients for black carbon ink are generally crude gums, or other crude organic matters, not free from albuminous parts, and decomposition of the whole compound takes place of necessity. R. D'HEUREUSE.

New York city.

Sirups.

MESSRS. EDITORS:—The explanation of Prof. Chandler, as recently quoted in the SCIENTIFIC AMERICAN, of the formation of sirups from refined sugars, I do not dispute. Such sirups are what they should be. I venture to assert they will not blacken the teeth. But the "golden sirup" made from starch and sulphuric acid is an imitation of these. That iron should necessarily occur in glucose sirup, is not true; but I contend that all I have examined did contain it, which I suppose was caused by the long continued action of the acid, upon the iron vessels in which the sirup is made, forming a solution of sulphate of iron (common copperas). When the manufacturers use other material, the test for iron may prove useless. Troemner's test for glucose can then be used. I don't wish to be understood as condemning glucose sirup. My purpose is only to give, to those who prefer cane sirup, the opportunity of distinguishing it. If the drippings of cane sugar contain iron, the sugar would exhibit like characteristics. I have applied the test for iron to cane sugar and molasses, and found none. The action of boiling cane juice, neutralized as it is by lime, has little effect on the kettles, as tests show. Under the circumstances, I say cane sirup, as now made on plantations in Louisiana, does not contain iron to an appreciable extent, blacken the teeth, or produce a burning sensation in the stomach, and that which does may fairly be supposed something else.

New Orleans. JOHN H. POPE.

Coal-Cutting Machine Wanted.

MESSRS. EDITORS:—The interest you take in improvements induces me to call your attention to the question whether machinery, or mechanical appliances, that will facilitate the mining of coal, thereby rendering operators less dependent on the miner, and relieving the consumer of coal from the high prices and fluctuations in consequence of strikes, cannot be invented. Now is a good time to call attention to a question of this kind, when 100,000 miners are on a strike, for no good cause, paralyzing all branches of manufactures that use coal for fuel.

I am operating in the Block coal field, of Clay county, Indiana. The vein of this coal is from three to five feet thick, and there are seams running through the vein every twelve to twenty-four inches, that make it very easy to mine. No blasting is necessary in this coal. All the miner has to do is to make a bearing-in with his pick, at the bottom of the vein, of from eighteen to thirty-six inches, when the coal is easily split out with wedges, the seams making this easy to do. If a machine were invented that would do this bearing-in, one miner could do the work of four or five. This would not reduce the demand for labor, as the demand for this Block coal is ten times ahead of the supply, as all the railroads that can get it are using it in preference to wood.

The inventor who constructs a machine that will mine this coal can make a good thing out of it, as every operator will want one or more for every room he has opened.

Indianapolis, Ind. J. R. ELDER.

[Patents have been taken for machines for mining coal, but we have not heard of their being introduced.—EDS.

Motive Power for Western Farmers.

MESSRS. EDITORS:—On page 49, current volume, of the SCIENTIFIC AMERICAN, is an article headed "Another Motive Power," which has set me to thinking that the new motor might be used more extensively than you there intimated.

The farmers of the great western plains are sadly in need of a new motive power. Agriculture has taken the first rank among all human pursuits; yet the farmer of the nineteenth century, the age of steam and telegraphy, plods along as his ancestors did, two thousand years ago, relying on the same forces, with this difference only: the modern farmer uses improved machinery.

But all machines require the application of force to make them move; and the only force at the command of the ordinary farmer, animal power, is expensive and inadequate. Put the farmer in possession of such a power as he demands, cheap and efficient, and we shall see as great a revolution in agriculture as has followed the introduction of steam to commerce and manufactures.

If compressed air can be made as efficient a power as steam, I propose that the farmer erect windmills to compress reservoirs of air, from which he could draw supplies to work engines, to draw his plows, cultivators, and reaping machines, to drive his threshing machine and corn sheller, as well as to grind his tools, churn his butter, and wash his clothes.

Windmills are easily and cheaply constructed, and, if it would not require cumbersome or expensive apparatus to compress the air and transmit its power to the various machines, I do not see why it should not almost entirely supersede animal power on the farm.

Wind is a variable power, and some may object to its use on this account; but there are rarely more than two consecutive days in which the wind would not produce the requisite force; and if sufficient power could be stored up to run the machinery of the farm during these days, this objection would wholly disappear. SAMUEL GRAY.

Homer, Ill.

Motive Powers--The Expansion of Gases, versus that of Fluids.

MESSRS. EDITORS:—Heretofore gases have been chiefly employed to utilize the expansive force of heat. Gases are elastic and compressible; fluids are—water, at least, is—nearly incompressible. Gases expand with a force in proportion to the increment of heat; water, with a force equal to its power of resisting compression—*i.e.*, the same increment of heat that would expand a volume of water in the open air, would expand it under any pressure, and doing any amount of work. Apply heat to water, and it will burst the strongest vessel you can put it into. Why will it not move the most heavily loaded piston you can apply it to? It will: but it is objected that the motion is too slow, and not powerful enough to be available. Let us see. Eight thousand and odd feet of inch copper pipe can be coiled in a jacket 6 feet × 6, without having the pipe nearer anywhere than half an inch, and leave a core in the center. Let the pipe be filled with water; the temperature can easily be varied, one half of the number of degrees between the freezing and boiling points, by filling the jacket alternately with steam and cold water. This I know by experience. This gives an expansion of $\frac{1}{46}$ of the bulk at the minimum temperature, or enough to fill a cylinder 3 by 12 inches 20 times; and this operation can be repeated once a minute, or oftener, if necessary. Now, a piston rod of 3 inch steel fitted to this cylinder, without a follower (the pressure exerted only on the outward stroke, against the end of the piston rod) would transmit 150 horse power, while the steam (at saturation) required to fill the jacket once a minute would not be so much as whistles through a 25 horse power engine every revolution. A continuous motion is secured by having two such apparatus, one contracting and furnishing a vacuum to exhaust into, while the other is expanding, and doing the work, and *vice versa*. Now, I repeat, *the same heat that will expand that water in the open air will make it exert one or one thousand horse power, according to the strength of materials.* I have produced over 600 pounds pressure in a small experimental tube 100 feet long, by simply pouring hot water into the jacket.

I have not the means to experiment on a large scale, or to introduce my motor to the public; hence this article. I will give any particulars. and show plans and specifications to any one who will furnish means to do so. F. SHAW.

Cordova, Ill.

Improvement in Mowing Machines.

MESSRS. EDITORS:—I have located a grass line for the mowing machine, and have made an improvement in the cutting point, the object of which is to prevent the blades from choking, a great drawback in harvesters. Choking is caused by the blades entering too far into the grass, or grain, when the cut is made. In very thick or wet grass, or grain, the blades slip over the grass, and draw it into the inside of the guards, which clogs the machine down, and stops the team. The operator is then obliged to pull the grass out with his hands, before starting again. This improvement will apply to all fashions of wheels and gearing. In all machines there are four gear wheels, two spur wheels, and two bevel wheels. Some have too many cogs, and some not enough. My grass line I fix at one fourth of an inch before the blades are full.

The following wheels and gear will cut at or before it reaches this line: Spur wheel, 62 cogs; its pinion, 11 cogs; bevel wheel, 44 cogs; its pinion, 11 cogs; total, 128 cogs.

This arrangement of gear and number of cogs will produce the result of the grass line I have described, and will work anywhere without choking. LABAN PERDEW.

Galion, Ohio.

How to Keep a Churn from Frothing Over.

MESSRS. EDITORS:—Happening one day to visit the house of a friend who kept a cow and made butter, I there saw a simple method he used to overcome the great trouble of all butter makers using the old-fashioned upright churn, viz: the overflowing of the cream during the process of churning. His plan was as follows: Take the body of the churn and cut a groove around the inside of the mouth, about three inches from the top and three eighths of an inch deep, and then remove half the thickness of the wood, making a shoulder all around; then take the cover and cut it to fit nicely inside, and you have now done away with all the old nuisances of cloths, tubs, pans, etc., heretofore required to save the cream that flowed over. Any man, almost, can do this, or the churn may be taken to a carpenter and treated for a few cents. Many an idea of less consequence than this, is patented, but all may take this one for what I gave for it.

W. A. MACKENZIE.

Eastport, Me.

A CORRESPONDENT informs us that apples may be kep from decay by covering them with dry ashes, a method easily tried, and if found satisfactory, capable of extensive application.

INTERESTING SCHOOL STATISTICS.

[CHIEFLY FROM MR. KIDDLE'S ANNUAL REPORT.]

There are, in New York city, 271 schools of all classes, attended by 102,608 pupils. The percentage of absentees in the boys grammar schools is 11½, and in the girls, 14, showing that the boys are more regular in attendance than the girls. The pupils of the colored schools are far more irregular, the percentage of absentees being 35.

Allowing 100 cubic feet of space for each pupil in the grammar schools and 80 in the primary, it appears that the school buildings in New York afford accommodations for 99,437 pupils; but owing to changes in population, some of the school buildings are situated in neighborhoods where the attendance is necessarily small, while a few others have 3,000 more than they ought properly to receive.

In the matter of discipline, 88 per cent of the girls' schools and 64 per cent of the boys' are excellent. In reading, 63 per cent of the girls' schools are excellent, and 28 per cent of the boys'. In spelling, the girls are 42 per cent excellent and the boys 27 per cent. In writing, girls 60 per cent, boys, 36 per cent. In arithmetic, girls 30 per cent, boys, 24 per cent. It thus appears that the girl schools are in every way superior to the boys.

The number of teachers in all the schools is 2,683, of whom 363 are males and 2,320 are females.

The appropriation on account of salaries for 1871 is $1,690,000, which affords an average of nearly $630 for each teacher—or $16 a year for each child instructed; but as the total expenditures of the Board of Education are $2,636,000, it will be seen that the cost to educate one child is something over $26 per annum. The average number of pupils per teacher is 38, but in some of the primary schools, we have seen classes numbering nearly 100.

It costs $83,000 per annum to heat the school buildings, and $105,000 to pay the janitors.

Keeping pianofortes in repair is a matter of $2,500, and the Board of Education want for advertising and printing, the snug sum of $36,000.

Two hundred and eighty-seven boys and girls were banished from our schools during the year as incorrigible, out of 100,000 in attendance. This number is large of itself, but is a small percentage of the whole number, and speaks well for the power of "moral suasion," which is all the teachers have to rely upon since the abolition of corporal punishment.

It appears that 21,912 persons attend the evening schools, of whom 3,846 are over 21 years of age; 15,423 are males. 6,023 are females, and 466 colored of both sexes.

The most extraordinary information of all is in relation to the instruction in the natural sciences. Botany is taught without books or plants; Mineralogy without specimens; Physiology without charts, and Natural History with no means whatsoever for illustration. Some of the teachers have extemporized for themselves limited collections, and the pupils, in self-defense, have brought such odds and ends as they have been able to procure at home or on the streets; but that the great city of New York should be so utterly destitute of everything relating to the study of the natural sciences is an unspeakable disgrace, as inexcusable as it is disgraceful, and we trust that the recommendation of the Superintendent of Public Schools, on this important subject will be carefully heeded by the Board of Education, and that the evil complained of will be fully remedied before another year.

The Honey Trade.

This article, which, twenty-five years ago, formed quite an insignificant article of trade in this country, is rapidly increasing year after year in domestic production; whilst the amount imported is growing smaller.

In 1860 the total product of honey of the United States reported, was 23,366,357 pounds. New York stood at the head of the list, with 2,369,751 pounds, followed in order by North Carolina, 2,055,969 pounds; Kentucky, 1,768,692 pounds; Missouri, 1,585,983 pounds; Tennessee, 1,519,390 pounds; Ohio, 1,459,601 pounds; Virginia, 1,431,591 pounds; Pennsylvania, 1,402,128 pounds; Illinois, 1,346,803 pounds, and Indiana, 1,224,489 pounds; all other States falling below 1,000,000 pounds. In the winter of 1868–69, the Department of Agriculture sent out circulars, to known apiarians in most of the States, and received returns from 489 counties in 32 States. The aggregate number of hives reported was 722,385. Estimating for counties not reporting, and making due allowance for the fact that many of the counties reporting were giving special attention to bee culture, 2,000,000 of hives were deemed as low a figure as the returns would warrant. Allowing fifteen pounds of surplus honey to the hive (about two-thirds of the average reported), the total product in 1868 would be 30,000,000 pounds, which, at an average valuation of 22½ cents per pound, would give $6,750,000. When we consider that the cost of production is merely nominal, it will be seen that it pays to keep bees.

Men of Progress.

O. E. Garrison, civil engineer, St. Cloud, Minn., writes; "It is with pleasure that I acknowledge the receipt of the splendid steel engraving, "Men of Progress." I desire to say that in my judgment the men there portrayed have done more real good to the world than all the warriors, conquerors, generals, and kings, ancient or modern, history has given an account of."

M. S. Sharpe, Pendleton, S. C. writes: "The papers and engraving came to hand all right. The engraving far surpassed my utmost expectations, and Mr. A. J. Sitton, to whom the credit for getting up a club is due, expresses himself highly pleased."

History of Railroad Cars.

Of the cars constructed between the years 1826 and 1850, we may first notice those made in 1830, and placed upon the Liverpool & Manchester (England) Railway. These cars had four wheels, but no springs, the bodies consisting of sills, to which the journal boxes were bolted and upon which the floors were laid. From the sills, stakes or posts arose, to which pieces of wood were attached, some longitudinally and some vertically; and these cars were formed without roofs, they being similar to those now used, and termed "rack-cars." In 1831, in October, one Mr. Joseph Knight proposed to employ springs under all cars, to support the body of the car and contents thereof. Mr. Knight also suggested an improvement in car wheels which entitles him to be ranked as among those who have excited our wonder, and who, by the exercise of his genius, has, more than most others, contributed to the successful operation of railroad cars. The improvement suggested at this time was that the treads of car wheels should be made conical, for the purpose of facilitating their passage around the curves of the road. How important this suggestion was all now fully realize, and it is not regarded as saying too much that up to this time no more important improvement, which has referred to railroad cars, has been made in this or any other country.

In 1869, cars for the transportation of passengers in England and Scotland consisted of three classes, the first class being well finished and provided with seats for the passengers to sit upon, which seats were furnished with cushions. The second class were of plain finish, without cushions or ornaments. The third class were little more than plain boxes set upon wheels and supplied with seats, but in many cases had no roof. In addition to these three classes, there were what were termed "mixed carriages," which were designated by names, and consisted of three compartments, the center one being for first-class passengers, and the two end ones for second-class passengers.

The next novelty which will be mentioned in the way of passenger cars was introduced in the year 1847, by a Mr. Hanson, of England, and consisted of a compartment car, the body of which was iron, and constructed as follows: In each of the partitions there was placed a hoop of iron, which was bound together by two cross stays, one of which connected the roof to the floor. To this frame-work a sheet or sheets of iron were riveted, a sheet of felt being placed between the heads of the rivets and the sheets of metal. These cars had only one seat in each compartment, it being so arranged that the faces of the occupants could always be in the direction in which the car was moving. At the bottom of the car there were arranged boards for resting the feet upon, which consisted of an upper and under piece, with a space between the two into which to thrust the feet, the inner surfaces being covered with sheepskin with the wool on it, the object being to provide for keeping the feet of the passenger warm during the time of his occupying the seat. At about the hight of the faces of the passengers there was placed a head-board or cushion, formed of sponge, and covered with leather or cloth, so that in the event of any sudden shock upon the cars, the head of the occupant would be brought in contact with the cushion, and thus, to some extent, be saved from injury.

A freight car, introduced at the same time and by the same inventor, was of the same general construction, except that its interior was arranged for the reception of freight, and a portion of its roof was made to slide upon rods over or under the fixed portion, the object being to provide for the reception and discharge of the goods through the roof of the car.

In the same year, 1847, a very decided novelty in the shape of a car wheel made its appearance in England, which consisted of a wrought iron wheel, which was made in sections, a portion of the hub and rim comprising each section, and parts being joined together by means of tongues and grooves formed thereon as the sections were made, and each being provided with a projection upon the outer segmental surfaces to enter a groove formed in the entire surface of the tire. The hole in the hub of the wheel for the reception of the axle was bored larger than the axle, so as to leave room for the insertion of an expanding ring, the insertion of which was to fit the axle, while its exterior was conical in form, so that, as it was forced inward, the segments would be forced outward, and thus tightened within the tire, the cone being held in place by a ring, which was cast in two parts, and placed in a groove turned in the axle.

At about the time of the last-named date, in contracting for the passenger cars to be run upon the road leading from Strasbourg to Basle, in France, it was stipulated that the roofs, partitions, and seats were to be made of American pine, three fourths of an inch in thickness, and that the roofs were to be covered with three pieces of leather, weighing at least thirty-eight pounds each.—*National Car Builder.*

EXCAVATION AND EMBANKMENT TABLES—ADDENDUM.—In connection with the article under this heading, on page 103, the following should have been included:

"The foregoing is on the basis of the slopes being 1½ horizontal to 1 vertical, and the constant number to be added must be increased or diminished, as the slope is flatter or steeper, at the rate of 27 for every half foot increase or decrease in the horizontal designation of the slope."

EVERY time a shot is fired from Krupp's 1,000 pounder, it costs the Prussian government 800 thalers ($600), and the monster of a gun itself has cost more than would keep an infantry regiment for a whole year.

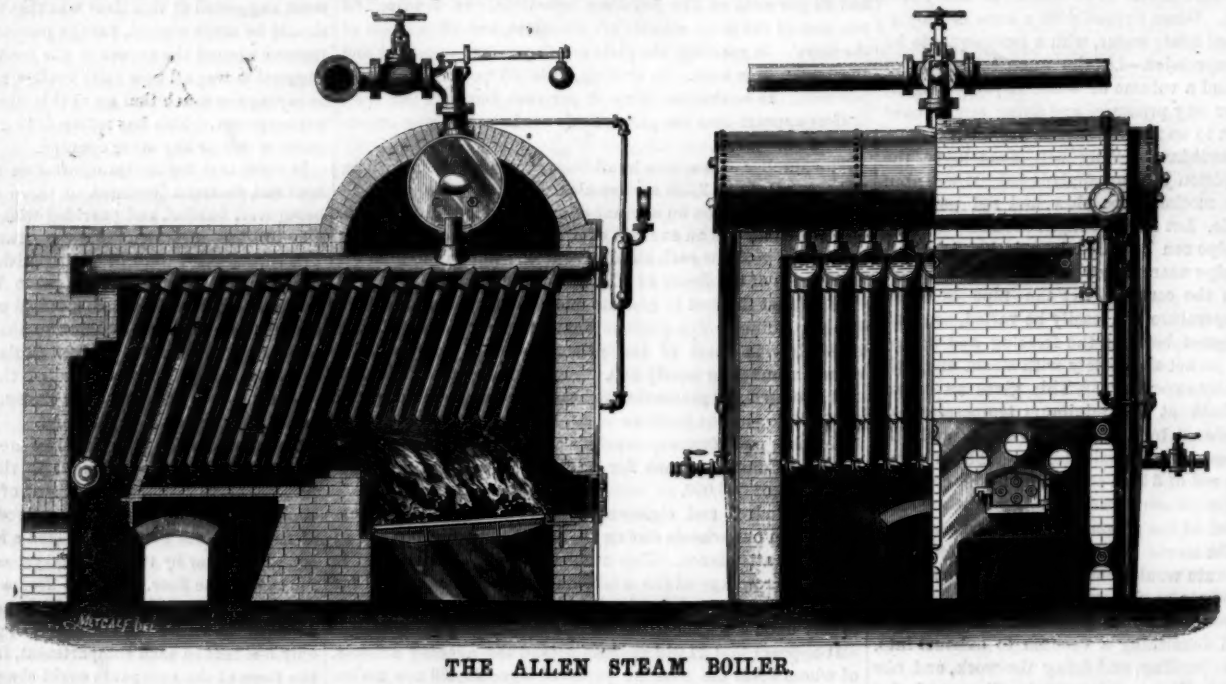
OBJECTS seventy-two feet long can be distinctly seen on the surface of the moon by the great telescope of the Earl of Rosse.

Improved Sectional Tubular Steam Boiler.

Our engravings represent the Allen steam boiler, which many of our readers will recollect seeing at the late Fair of the American Institute, where it furnished steam to the Allen engine, an illustrated description of which appears on page 374, last volume of this journal. Two views are given, the first of which is a longitudinal section, and the second a half-cross section and half-front elevation. The boiler gave, on test at the Fair referred to, an evaporative capacity of ten pounds of water per pound of coal, under working pressure of from 60 to 80 pounds. When this economy of fuel is considered, in connection with the admitted safety of sectional boilers as a class, it will be acknowledged that the managers of the Institute acted wisely in engaging the same boiler to furnish steam for the exhibition of 1871.

The boiler was first exhibited at the Fair referred to, and was awarded the first premium. Its construction is such as obviates all strain due to unequal expansion, and a very large heating surface is obtained.

Perfect circulation is claimed to be obtained by inclining the tubes as shown in the longitudinal section. These tubes descend obliquely from larger tubes, in which the water line is shown in the half-cross section, and which in turn communicate with an ample steam dome, where the steam is super-heated, so that under ordinary circumstances, if any water be mechanically carried along by the steam to the dome, it is immediately converted into steam, and dry steam only can issue from the boiler. Provision is, however, made for preventing accumulation of water in the steam dome, through carelessness in carrying water too high, etc., by pipes leading from the ends of the steam dome down to the feed pipe.



THE ALLEN STEAM BOILER.

The cold water descends along the under sides of the inclined tubes, and the steam rises along the upper sides.

Both the outside and inside of every part of this boiler is perfectly accessible for cleaning, hand holes being formed at the lower ends of the inclined tubes, and at the front ends of the horizontal tubes. The gases have but a short distance to traverse, and ample space in passing between and around the tubes, so that a good draft is easily maintained.

The feed water is admitted at the lower end of the rear series of inclined tubes, and, coming first in contact with the cooler portions of the heated gases, passes along, as it becomes hotter, to the front tubes where the flame is the hottest. This construction enables the heat in the cooler portions of the gases to be utilized to the fullest extent.

The boiler can evidently compete in cost of construction with other sectional boilers, in market, and we have no doubt it will also be able to compete in economy.

The demand for safe boilers is daily increasing. Numerous disasters from explosions have caused people to consider whether an economy which renders steam boilers unsafe unless kept constantly under the supervision of careful experts, is not after all dearly purchased. To such as have decided this question in favor of safety, this boiler offers all they can desire on that score, while, at the same time, its evaporative power is quite equal to most of the boilers in market, whether sectional or otherwise.

For further information, address The Allen Engine Works, 4th avenue and 130th street, New York city.

Telegraphic Possibilities.

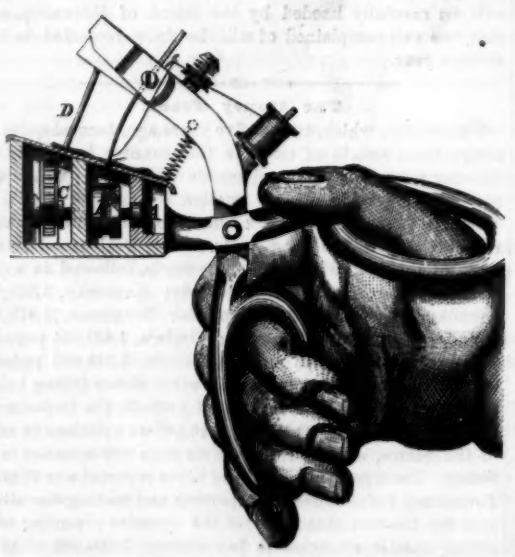
On the completion of the Russian-American telegraph line, a telegram from Alaska for New York, leaving Sitka, say at 6·40 on Monday morning, would be received at Nikolaief, Siberia, at six minutes past one on Tuesday morning; at St. Petersburg, Russia, at three minutes past six on Monday evening; at London, twenty-two minutes past four on Monday afternoon; and at New York, at forty-six minutes past six on Monday forenoon. Thus, allowing twenty minutes for each re-transmission, a message may start on the morning of one day, to be received and transmitted the next day, again received and transmitted on the afternoon of the day it starts, and finally reach its destination on the forenoon of the first day—the whole taking place in one hour.

Cheese Making.

It is absolutely necessary that means should exist in all dairies for preserving an equal temperature throughout the year; the cold of winter being hardly less injurious than the heat of summer. Care should also be taken to secure a plentiful supply of pure water, effective drainage, by which the water may be carried rapidly away, thorough ventilation, and facilities for the exercise of the most fastidious cleanliness. The building should, if possible, be built on the side of a gentle declivity facing the west, and sheltered from the north and east winds. In order to maintain an equal temperature, the walls should be of a considerable thickness, and built with a hollow space in them, through which a current of air may pass; the roof should also be of brick, of a curved or pavillion form, and the walls and roof may be plastered. The floor should be sunk about three feet under ground, made to slope to a drain (with bell trap) in the center, and paved with tiles or polished stone. On three sides of the dairy small arches should be turned about three feet high, carrying a shelf of slate or marble three feet wide, to hold the pans containing milk, and a little above this shelf, ventilating bricks should be placed with shutters sliding over them to open or shut, according to the weather. Several landed proprietors in Shropshire and Cheshire (England) have recently erected expensive and highly ornamental dairies on their estates, fitted up with massive marble tables and milk coolers, and with a constant stream of water passing through them, but these are kept more as a luxury than an object of profit, and they seldom unite all the conveniences essential to a good dairy, because the architects who plan them are seldom or never practical farmers.

HAND SEWING MACHINE.

A hand sewing machine, worked by the hand like shears, is, to say the least, a unique device. Our engraving shows such an implement. It is a lock-stitch machine. A is the bobbin; and B the hook or shuttle worked by the rack and pinion, C. The rack reciprocates in guides, and is impelled by the pitman, D. In use, the cloth is supported at one end by a sewing-bird or similar device, the other end being held tight



by the left hand. The machine is then grasped by the right hand, and worked along the seam, making one stitch for each reciprocating movement of the parts. This machine is the invention of B. W. Collier, of Oxford, Miss., who obtained a patent upon it in 1867.

The Uses of Salt.

The extent and importance of the uses of salt can scarcely be better described than in the words of Dr. Bolley, which we translate from his work, entitled "Das Kochsalz:" "We awake in the morning; the linen which we put on betrays by its whiteness that it has been bleached by the chlorine derived from salt; the shoes with which we cover our feet required salt in the hands of the tanner; in the soap that we use for the toilet, we seize a transformed piece of salt; the glass, which we bring to the mouth, hides the chief ingredient of salt; from the crude ore by means of salt, was produced the bright, white metal of the teaspoon, which is so highly esteemed by the world; the teakettle is soldered with borax which holds soda produced from salt; the milk before us contains salt; the butter has been preserved by salt perhaps for months; the bread betrays to the palate that the dough has been mixed with salt. We grasp the paper; it required the application of chlorine from salt in order to please us by its whiteness. The clean spectacles through which we see are partly composed of what once was salt. A visit is announced; a patient wishes to consult us; he enters, and, seeking scientific aid, we reflect upon the remedies at our command, and commence to write. Out of ten medicines we find that five of them owe their origin, either by their composition or the mode of their preparation, to salt. Who is able to forget for one moment this ever-present Proteus that appears in a thousand forms?"

Patent Cultivators.

Commissioner Capron, in his last report, remarks that little or no change has taken place in the manner of constructing cultivators. It is a matter of surprise, that out of the one hundred and fifty inventions patented, there should be scarcely one that for characteristic individuality merits especial mention. Inventors of this class of implements seem to be pretty well satisfied with the general construction already established, viz: a rectangular frame mounted on two wheels, and provided with a tongue and driver's seat, having swinging longitudinal beams, to which are rigidly attached standards bearing shovels or teeth, and they content themselves with improving the details. For this reason, most of the claims granted on cultivators (and patents on these machines generally embrace a long string of claims) are what are technically known as "combination claims," *i. e.*, claims on which the patentee disclaims the invention of the individual devices enumerated, but asserts that he is the first one to have brought them all together in the manner specified.

It is difficult to decide whether or not the tendency has been toward greater simplicity in cultivators. Some inventors seem to have aimed at that result and to have hit the mark, while others appear to have overlooked the idea, altogether. This remark is intended only with reference to a comparison of a few recent years, for certainly, when compared with similar inventions of twenty years ago, the complexity is all on the side of the more modern productions. Indeed, this is a safe general expression with regard to inventions of every character. The tendency of inventions at the present day is twofold, viz: to make each machine as nearly automatic as possible, and to combine in one structure the devices necessary for several purposes. These necessarily make machinery more cumbrous. It is not an exceptional thing to see combined with a cultivator, apparatus designed for several different purposes; as a breaking plow, a corn marker, a seed planter, a stock chopper, or a harrow.

In cultivators, considerable attention has been devoted to obtaining a ready and efficient expansibility and contraction of the beams, so as to admit of the adaptation of the same to the width of the rows cultivated. Successful attempts have been made to improve the shape of the teeth, that their cutting edges may act more efficiently, and to improve their adjustability, so as to throw the soil more or less to the right or left, all one way or the other, when in gangs, and to adjust their positions where more than one is used. Considerable intelligent labor has also been bestowed on constructing the teeth, so as to admit of their ready removal when worn out, or when, from any cause, it is desirable to detach them.

Several cultivators have been patented, especially devised for the culture of cotton and sugar, and which will be likely, in view of the past want in those directions, to prove valuable, and consequently to go into general use.

As in the case of plows, the tendency is decidedly in favor of wheel cultivators.

METEOROLOGY IN IOWA.—The extreme dryness of last summer produced some very unusual phenomena in many parts of the United States, of which the meteorological appearances in Iowa may be specially mentioned. A correspondent, J. C. W., of Toronto, Iowa, describes the following; On March 16th, "a rare sight of sunbows;" September 24th, a magnificent aurora borealis; October 14th, "a fog sight," followed by another aurora; January 20th, a large meteor; and on February 5th, a snow storm, in which flakes of snow as large as snow birds fell in countless numbers.

TRUTH will ever be unpalatable to those who are determined not to relinquish error, but can never give offense to the honest and well meaning; for the plain-dealing remonstrances of a friend differ as widely from the rancor of an enemy, as the friendly probe of a physician from the dagger of an assassin.

Scientific American.

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NEW YORK, SATURDAY, FEBRUARY 25, 1871.

Contents:

(Illustrated articles are marked with an asterisk.)

THE HUDSON RIVER RAILROAD DISASTER.

To be just and candid under strong excitement is hardly to be expected of the public at large. On the occurrence of such a horrible disaster as the New Hamburgh tragedy, it is to be anticipated that charges of blame willl be made indiscriminately, and without that careful weighing of both sides of the question, by which only can a correct judgment be formed.

Weighing both sides as carefully as we can, however, and desiring, if possible, to see in this accident one of those purely fortuitous events against which no human provision or foresight avails, we are reluctantly forced to conclude that there was neglect of duty on the oil train, and a want of provision against accidents at the drawbridge, which is clearly chargeable to the company, and for which it ought to be held responsible.

Whether, in this particular case, if the brakemen had been at their several posts on the oil train, and a proper signal cord had been attached to the bell of the locomotive, the breakage of the axle would have been discovered, and the engineer notified in time to have stopped the train before it entered the bridge, is a question upon which opposite opinions have been expressed at the inquest. Our opinion is, that had these regulations been strictly observed, there would have been no accident. If our opinion is sound on this point, the employés were either to blame in disobeying orders, or blameless in neglecting habitually what the lax discipline of the road had virtually countermanded. If the latter, then to the company must be transferred whatever blame would otherwise rest upon the persons in charge of the oil train.

Looking candidly at the evidence taken at the inquest, our opinion is, that there was not that laxity of discipline in regard to the regulations referred to, as would warrant the employés in regarding the regulations as virtually set aside, and therefore they must take their share of the blame.

On the part of the company, there is undeniably responsibility for neglect at the bridge. The signal man, working under orders that required his presence a quarter of a mile or thereabouts from the signal light, was thus prevented from changing the signal in time for the express train to stop. Had he been at the bridge, and changed the light from white to red, with even ordinary celerity, we have not the slightest doubt that so faithful and vigilant a man as Simmons, the unfortunate engineer of the express train, would have instantly seen it, and stopped his train before it reached the disabled oil train.

Now, while we think the men on the oil train were blamable for neglecting their duty, even on a night when the inclemency of the weather rendered the temptation to cuddle together in the caboose a strong one, what shall we say of the company which habitually requires a signal man to leave his signal to go a quarter of a mile away, in order to do double service, thus making the supervision of a point of danger only partial and fitful. Whether from parsimony, or want of judgment and foresight, there is for this neglect no even tolerable excuse.

The public has a right to demand foresight from railroad officials, and a proper expenditure for guards and watchmen to render traveling reasonably safe. The public pays for this, and if it be not given, the public is defrauded. Such frauds are, however, not to be classed with such as merely affect our pockets, or our personal comfort. They endanger and destroy valuable lives, scatter mourning and desolation over the land, and shock the moral sense of the entire civilized world. Therefore, we say, let the Hudson River Railroad Company be taught that an accident of this kind is something that even a soulless corporation can be made to feel, and that the public is firmly resolved it shall answer for to the fullest extent.

We are not prepared to say that the company is blamable for any known defect in the rolling stock. If that of the freight trains be kept in as good order as that of the passenger trains, which on this road have always been considered first-class, there is nothing to be said on this point. But if, on the contrary, the rude character of the freight trains had induced the company to supply them with inferior axles, or if the particular car in question had knowingly been permitted to run over the road while in an unsafe condition, then the responsibility for the consequences of such neglect, however unexpected, lies at the door of the corporation. No charge that the broken axle was known to be of inferior quality has yet been made, and hence we are willing to believe the company innocent in this respect.

The accident, however, teaches the important lesson that inferior stock in freight cars *may* result in the destruction of passenger trains. Axles will break, no matter what care be used, but inferior axles will break more frequently than good ones; and if the best stock in a freight car may give out, and so endanger passenger trains, poor stock will certainly increase the risk.

With regard to the carrying of petroleum oils over roads used for the transportation of passengers, it has been urged that it never ought to be permitted. We cannot see, however, in what way this can be well avoided. The demand for these oils is universal, and consumers must be supplied in some way. Special railways cannot be constructed for their transport, except in exceptional cases, and, if their carriage be confined to water conveyance, vessels collide as well as railway trains, and fire on water is even a worse disaster than fire on land.

It is folly, also, to attempt by legislation (a bill has already been introduced into the New York legislature for this purpose) to compel companies to use iron-hooped casks, instead of the tanks now used, for the carriage of oils. The more packages are multiplied the greater, in our opinion, is the risk. Had the train which broke at the New Hamburgh station been freighted with small casks, the probability is that the horrors which attended the disaster would have been hightened by a series of explosions, which would have prevented any immediate approach to the fated train by those anxious to aid the sufferers.

TOUGHENING AND REFINING GOLD.

Mr. Francis Bowyer Miller, brother of the late Professor William Allen Miller, of London, is now in this country, engaged in setting up his apparatus in the Philadelphia mint, for the purpose of toughening and refining gold on a large scale. Mr. Miller is now melter and refiner of the mints at Sydney and Victoria, Australia, and has had, in his official capacity, abundant opportunity to test the accuracy and economy of his invention. The process devised by Mr. Miller consists in passing a stream of chlorine gas through the melted gold, covered with a layer of borax. In a few hours the whole of the silver present is converted into chloride, which floats on the gold. The borax prevents the loss of silver by absorption or volatilization. As soon as the gold has become solid, the still liquid chloride of silver is poured off, and the gold is now found to have a fineness of 993 parts in 1,000. The loss of gold is less than in the ordinary processes. It is necessary very carefully to dry and heat the molds, into which the chloride of silver is poured, as the slightest moisture causes the latter to be violently dispersed, while red hot, to the great risk of the bystanders. To avoid the risk of splitting the pots by the wedging of the ingots at their contracted bottoms, the gold for refining is cast in molds of a peculiar form, yielding slipper-shaped ingots, two of which, placed face to face, fit conveniently into the pot. The chlorine is conveyed to the bottom of the melted gold, through clay pipes, which are well heated before immersion, and the gas can be heard bubbling up through the fused metal quietly, and without projecting globules from the pot.

Mr. Miller's method has been adopted at the London mint for toughening gold previous to coining; and upwards of 200,000 ounces of gold have been refined by it in Australia.

By the erection of a a new reverberatory furnace for silver refining, and by the adoption of Mr. Miller's process, it is believed that a very considerable reduction in the rates for refining bullion can be attained in this country, while the quality of the precious metals will be greatly improved.

ELECTRO-METALLURGY.

Many of our readers are of course conversant with this subject, but to those who are not, we offer these few remarks, on a most interesting and useful art. It is the art of copying any surface upon which any cut or raised figure exists, or of covering or plating any smooth or other article, by depositing on it, copper in the metallic form by galvanic agency. Let one of our readers attempt this beautiful art, and he will find no difficulty in producing a fac simile of his coin or other article upon the first trial. Suppose, for instance, a copy of the face of a coin or medal is desired. Let him proceed thus:

Dissolve in a quart of cold water as much common blue vitriol (sulphate of copper) as the water will take up, and let it stand until it clears; then pour off the clear solution, and add about one fourth more water, as the solution is better when not quite saturated; pour the diluted solution into a vessel of earthenware or glass, with a wide mouth, and suspend in it a piece of copper plate two or three inches square, turned over the top of the jar to hold it up—the copper plate should be nearly all immersed. Then suspend, opposite to the plate, and parallel with it, the coin to be copied, by a piece of wire, having previously covered that portion of the coin not requiring to be copied with wax, which will prevent copper being deposited, the wax being a non-conductor. Let an electric current, from any species of battery, be now passed through a wire connected with the copper plate, which is the positive pole, to the negative pole, the coin, and thence to the battery, completing the circuit. The vitriol in solution is thus decomposed, the electro-positive element or the copper going to the coin, and forming a uniform and solid coating upon it, while the sulphuric acid set free attacks the copper plate, and renews in the solution the sulphate which is decomposed by the current.

This action may be continued, until a thick coating forms on the surface of the coin, the deposition of which will be fast or slow, according to the strength of the battery.

To prevent the copper adhering to the face of the coin, moisten the latter with sweet oil, and rub it with silk, till it appears dry.

To coat objects which are non-conductors, a fine powder of graphite or black lead may be laid thinly over the surface with a brush. Even glass or porcelain may be covered, by first etching the surface to make it rough. This, of course, will give an inverted copy of the coin, so that to get a copy "right side up" an exact impression must be taken in wax, plaster of Paris, or gutta percha, and the metal precipitated on the cast.

Brass can be deposited when the solution is composed of 1 part sulphate of copper in 4 parts of hot water, 8 parts sulphate of zinc in 16 parts of hot water, 18 parts cyanide of potassium in 36 parts of hot water. These are mixed, and 250 parts of water added. Instead of a copper plate, one of brass is necessary; the solution is required to be kept nearly boiling, and a powerful battery to be used.

To the lover of natural history, the electrotype offers two processes of great beauty and value. By a simple adaptation of the principles above detailed, the most accurate copies may be made of any vegetable or animal substance that will remain undecomposed in the solution for a few hours. Thus the most delicate hairs, and tendrils of plants, and the smallest insects may be coated with metal and preserved.

The second process, called "nature printing," is generally used for impressions of plants. The plant is pressed with great force upon a plate of lead, to make a delicate impression. Then, by means of electrical action, these lead plates have copper deposited on them heavy enough to print from. Some of the finest plates in the best botanical works, are prepared in this manner.

Printing and engraving are much indebted to its agency. A hard copper plating is thrown down on the face of common type, increasing its durability, and entire stereotype plates are made by taking the cast of the type in gutta percha, or plaster of Paris, and depositing a thick plate of copper upon the reverse mold. Elaborately engraved plates are also by this means reproduced. Usually copper plates after passing through the press about one thousand times, become worn, so as to give indistinct impressions, and by electro-metallurgy these plates can be multiplied indefinitely. Other metals and alloys can be precipitated, of which process we will speak another time.

THE LARGEST GUN IN THE WORLD.

The latest born offspring of the art of destruction is a thirty-five tun gun, just completed at the Royal Arsenal, in England. This monstrous creation was made upon the coil principle, with two strips of wrought iron, which, before they were wrapped round the core, were about 150 feet in length. On its way to the practice ground, it crushed its own carriage and the tramway upon which it was traveling, but it was coaxed into moving again, and the sponsors of the interesting infant fired it with half a proof charge, and its own shot weighing 700 lbs., and measuring a foot in diameter and two and a half feet in length. With this load, the monster recoiled nearly nine feet up an inclined trail of seven degrees, but was otherwise unaffected. When it has cut its teeth with larger charges, it is to burn, as a regular dose, 120 lbs. of pebble powder, the shot being the 700-pounder mentioned, with brass studs to fit the rifling of the bore. In firing it, a wire was attached to the vent, the bell was rung, and all present hastened under cover. In one of the proof houses a gunner in a canvas suit stood before a magnetic battery, and at the word "fire," touched a stud, when there was a loud report, and the gun was seen smoking prodigiously. It will be tested with a charge of 150 lbs. powder, the regular service charge being 120 lbs.

It is the largest piece of ordnance in the world, not excepting those ancient Titans—the Beejapore gun, called the "King of the Plain," the huge stone-ball cannon of the Dardanelles, and "Mons. Meg." If an invading enemy will only be kind enough to come near enough to this triumph of belligerent art, we think there might be a chance of slaughter on both sides. But what a telescope might have been made for the money, and what different sort of "victories" might have been obtained with that sort of weapon! The reflection is, we know, ridiculous: "Guns, drums, and wounds" absorb the world.

DESIGN PATENTS.—Many letters reach us, complaining of the dilatory conduct of the Patent Office, in disposing of applications for design and trade-mark patents. Cannot Acting Commissioner Duncan do something to hurry up this branch?

A REMARKABLE GEOLOGICAL DISCOVERY.

Mr. Charles M. Wheatley, for many years a member of the Lyceum of Natural History of New York, and known to be an excellent naturalist and geologist, informs us that he has found a "bone cave" a few miles from Phœnixville, not far from the famous Wheatley mines, from which such choice specimens of lead ore were obtained a few years ago. This is one of the most important geological discoveries thus far made on our continent. It is the first genuine bone cave of America, and will help to solve some of the questions of ancient animal life of the Western continent. The floor of the cave is covered with remains of animals that are supposed to belong to the post-tertiary epoch. Professor E. D. Cope, of Philadelphia, is working up the animals, Mr. Horn will describe the insects, and it is hoped that Professor Newbery, of Columbia College, will study the plants.

So far, the investigations have disclosed 22 vertebrates, 5 insects, and 10 or more plants. Among the animals are the following: A large sloth, with gigantic claws, called by Jefferson the *Megalonyx*; a mastodon, with a tusk 11 feet long; a bear, fully as large as the grizzly bear, but entirely distinct in character from all the existing species of North America and the northern regions of the old world, as well as from the cave bear; a tapir, a horse, a wolf, and other skeletons not yet described.

We do not understand that any human remains, or any implements fashioned by human hands, have thus far been found. Many geologists are of the opinion that the mastodon, gigantic elephant, the great sloth, and many other of the extinct animals, have lived since the time of man, and the discovery of human bones in such a cave would confirm the theory.

Further developments will be looked forward to with great interest by the scientific world.

THE PECUNIARY PROSPECTS OF THE EAST RIVER BRIDGE.

The present winter has been unusually cold at this point, and both the North and East rivers have been filled with floating ice barriers, seriously interfering with the traffic between New York and the neighboring cities on Long Island and in New Jersey. The ferry companies have sustained much loss from damage to their boats, and people residing in the cities alluded to, and doing business in New York, have been obliged to submit to much detention.

These untoward events have given rise to much discussion, more particularly in the Brooklyn papers, as to the desirability of the early completion of the East River Bridge, which is evidently looked forward to as the great solution of the problem of quick transit between the two cities.

This bridge will, of course, if successfully completed, form an avenue by which travel may pass, unimpeded by fogs or ice, and free from the present inconveniences of ferry travel, but in our opinion it can never supersede the ferries as a means of transit, except on the occasions when ice or fog renders ferry passage unusually dangerous.

It is folly to suppose a single means of communication can absorb the whole travel between New York and Brooklyn, or a tenth part of it. The termini of this bridge can be reached, by a large portion of the residents of the two cities, only through an expenditure of as much time as would suffice to reach their homes by the routes they now take. Under ordinary circumstances, few will go, from a ferry that in fifteen or fewer minutes will place them across the river, a distance of a mile, or even a half a mile, to walk or ride across a bridge one mile in length.

In the ordinary routine of business, the travel will follow the shortest routes, and if a slight additional risk be unavoidable, it will take the risk, rather than make the sacrifice of time.

The traffic of the bridge will, in fine weather, be confined to small areas in the immediate vicinity of its termini; and that this, in connection with increased travel in bad weather, will make it a paying investment, we cannot believe.

In the provision of channels of communication for large and populous towns, not one large avenue, but many smaller ones, best meet the needs of the population.

INTELLIGENT LEGISLATION ABOUT MEDICAL PRESCRIPTIONS.

A bill has been presented at Albany which reads very much like a hoax, and we should hesitate to allude to it if it were not pretty well authenticated. There are three points in it. First, it is proposed to appoint a commission of five physicians to examine the prescription clerks of druggists, to see if they are competent to be licensed for their professions. As an offset to this, it might be well to have a commission of druggists to examine the physicians to see if they know how to write prescriptions. Second, Latin prescriptions are to be prohibited, in consequence of frequent blunders committed by druggists' clerks, not to say by ignorant doctors. Third, as the prescriptions will hereafter be in English, the patient will be able to ascertain what medicines the doctor recommends, and, in case of a second attack, can send to the apothecary to have the same remedies put up, and thus avoid the necessity of paying a second fee to the physician. To prevent this shrewd economy on the part of the patient, it is proposed to prohibit the druggist from putting up a prescription a second time, unless by order of the doctor, and thus to compel the invalid to send for the doctor, or to have recourse to quack medicines, the sale of which it is not proposed to restrict. It is difficult to conceive who could have concocted such a bill as this, so full of conceit on the part of physicians, so unjust to druggists, and so revolutionary in the whole history and practice of medicine.

If we could enact by law that the physician should know his profession before obtaining his degree, and the druggist his business before procuring a licence, it would be a good thing; but how to frame such a law, and how to enforce it, is not so easy a matter. And, to cap the climax, it is proposed to empower the mayor, who is supposed to be well read in phy ic, to appoint the examining board of five physicians, and thus to make our apothecaries' shops a part of the great political machine. As there are many drug stores in the city, and an army of clerks, each one of whom would have "to see" the five political doctors before obtaining a licence, it would be a good thing for the doctors, but we are not so convinced that the public would be any better served than they are under the present system.

Better leave the Pharmaceutical College to take care of the druggists, the Medical College to look after the doctors, and the mayor to attend to the business properly appertaining to his office.

HOW THE ICE BRIDGE IS FORMED IN THE EAST RIVER.

Within the week past, many thousands of persons have crossed the East river, between New York and Brooklyn, walking on the ice. It is popularly supposed that the preliminary to this feat must have been the freezing over of the river; and on every occasion of the kind, we are entertained with marvelous stories of the hair-breadth escapes of the venturesome pedestrians. A friend who resides in full view of the river, and who has for years observed the formation of these ice bridges, was one of the many crossers on Monday last. From him we derive the following explanation of the phenomenon:

The ice bridges of the East river are dependent entirely upon two simple conditions. The first of these is the existence of large fields of heavy floating ice *in the North river*, and the second is the prevalence of a westerly wind at the time the tide-stream ceases flowing toward the ocean, and commences to flow up the rivers—technically, at the last of the ebb and the first of the flood. Ice is very rarely formed in either of the river channels about New York, and may be said never to be formed with any sustaining power. Drift ice may be frozen together, and thus form in masses, but the currents are too active, and navigation too incessant, day and night, to permit anything like the freezing process usual in less disturbed localities.

To understand the formation of the ice bridges in the East river, we must premise that the width of the river at its mouth, opposite the Battery—described by the position of Hamilton Ferry—is twice as great as its width at the point near Catherine Ferry, where the bridge is being constructed; the latter point forming, as it were, the neck of a funnel. It is also needful to know that the tide-stream begins its upward flow in the East river, half an hour, and sometimes a full hour, before the same flow occurs in the North river. Let us imagine ourselves as floating in the North river, upon one of those immense fields or ice, which, by various means, become detached from the main body at a considerable distance northward from the city. We have been floating down toward the ocean for some five hours. We arrive at the lower point of New York Island after the tide-stream has commenced the upward flow in the East river. A westerly wind prevails. The downward stream on which we float is ceasing, because the ocean tide is already coming in to check it, and because of the large expanse of water in New York Bay. The wind drifts us, little by little, along the easterly shore of the bay. Presently the North river tide-stream is turned, and runs back up the river. But the East river stream has now attained a considerable velocity, and is "sucking" in from the North river whatever comes within its reach. The westerly wind facilitates this, by driving our ice field within its clutches, and then our journey up the East river is begun. A few moments suffices to bring us to the "neck of the funnel." One side of our ice field strikes the Brooklyn shore, and it is thus held, while the other swings forward until it strikes on the New York shore. If the ice be sufficiently firm and compact, it thus becomes a wedge, which the flowing tide but makes the stronger and more secure. Thus none but compact ice is strong enough to resist the tide, and that which does resist it is abundantly secure, not only for pedestrians, but even for horses, sleighs, and cars, if the use of them were practicable.

Only when the tide changes, and the stream returns toward the ocean, is the bridge broken. Then risks are run in endeavors to get off from the the moving ice. But the risks and dangers do not arise from the insecurity of the ice itself. All around the edges of the great field are small, detached pieces. Many persons, when they find themselves being floated off by the new tide-stream, become alarmed, and seek to reach the shore by hastily jumping upon these detached pieces, or by trying even to walk upon the water itself, and their temerity is punished in the usual way. Safety is only a question of time and endurance to those who have courage enough to remain and float until a landing may be effected directly, or by means of a boat.

RAIN STATISTICS.—Water is so universally present in the air that the influence of the moon upon the rain-fall, as on the sea, in the tides, may be watched with interest. Mr. Glaisher asserts, after much long and patient investigation, that the ninth day of the moon is the most rainy of the whole twenty-eight, and that in the first and last weeks of the moon's age, the rain-fall is less than the average. The records kept by Mr. Glaisher also indicate four o'clock in the afternoon as the rainiest hour in the day.

PROGRESS OF FOREIGN INVENTION.

It is interesting to watch the progress of invention abroad, and see how the inventive minds of both hemispheres move in parallel grooves. Our late exchanges bring accounts of several inventions recently patented in England, which have also been recently patented in the United States. Doubtless some of the English applicants have pirated American inventions which they knew were valuable in England, the door having been left open by neglect on the part of the original inventor, to secure his invention by foreign patents.

ORNAMENTING PAPER.

Mr. H. Airy, of Greenwich, England, has patented a process which consists in ornamenting paper, woven fabrics, and other surfaces, first, by the swinging of a compound pendulum, whereby a great variety of separate figures is drawn in ink of any kind, or in pencil, on paper of any kind, or on wood, or by a pointed instrument, on steel or copper plate coated with protecting matter for etching, whereby, also, these figures are traced by a pointed instrument on the surface of a copper cylinder coated with protecting matter; second, by a machine which closely imitates the natural figures drawn by the pendulum, and also executes a great variety of kindred figures, all coming under the definition given above. The machine is made to trace or engrave these figures on the surface of a copper cylinder, such as is used by cotton printers and others, or on the surface of a copper, or other soft metal plate.

INSTRUMENT FOR MEASURING ANGLES.

This is also an English invention. A reservoir of any suitable shape and material is formed, with an opening in its upper side or top, or elsewhere, and with this reservoir, at or near its upper and lower parts, are connected the two ends of a bent glass tube. The tube is raised at an angle or horizontally. The reservoir is partly filled with fluid, and the opening hermetically closed so as to prevent any escape of the liquid employed. One or each of the legs of the tube is marked with a scale or indicator representing degrees, minutes, and divisions of minutes, and when needed, another scale is placed in close proximity to the legs of the tube, and so constructed as to represent at once the distances corresponding to the angles of depression or elevation for given hights, indicated by the position at which the fluid subsides. The reservoir and tube are fitted in a frame or case, to preserve them from injury. Over the reservoir a shield of wood or other material is fixed by screws or otherwise, and when necessary, some non-conducting substance is inserted between the shield and reservoir, to prevent any effects from changes of temperature upon the fluid and reservoir. The top surface of the frame of the instrument will, as a rule, be made perfectly straight, and when so made for moderate distances, such as those visible to the naked eye, the line of sight could be taken along with it; but where long distances have to be brought within view, and great accuracy is required, a telescope is placed on the upper edge of the instrument and adjusted at an angle or otherwise to the horizon. The instrument, whether to be used with or without a telescope, is accurately graduated by a theodolite.

APPARATUS FOR EVAPORATING LIQUIDS IN SUGAR REFINING, ETC.

This is a French invention, in which the process of evaporation or boiling is commenced: either at the atmospheric pressure, with a decrease of one tenth, or one twentieth, or less (according to the number of boilers employed), in each succeeding boiler; or the process may be commenced at a pressure above that of the atmosphere and terminated at a pressure equal to the atmosphere, or, if desired, considerably below it, in which latter case, the two systems of evaporating above and below atmospheric pressure will be combined in one series of from twenty to forty boilers. The tubular steam space of the first boiler communicates by a pipe and suitable stopcocks, either with the exhaust pipe of an engine or direct with the boiler or steam generator. From the top of No. 1 evaporating boiler of the series, a pipe conducts the steam arising from the liquid under evaporation into the tubular steam space of No. 2 boiler, which discharges its steam arising from the evaporating liquid, through another pipe into the tubular steam space of No. 3 boiler, and so on throughout the series, the pressure in each decreasing by about from one tenth to one twentieth of the original pressure; for example, if the pressure in No. 1 boiler be that of the atmosphere, that of No. 2 will be (say) one tenth less, that of No. 3, two tenths less, that of No. 4, three tenths less, and so on. The liquid to be evaporated is introduced by a pump and stopcock into No. 1 boiler, and flows through connecting pipes and stopcocks into the others of the series, after which the connections are stopped, and the steam is let into No. 1 boiler, when the process commences; the steam or vapor arising from the last or nearly the last of the series, may be conveyed to a condenser. The requisite amount of vacuum is maintained in each boiler by one or more air pumps and stopcocks, and the contents of each boiler may be discharged through cocks or valves at the bottom thereof.

MACHINE FOR CUTTING TOBACCO, ETC.

This is an English invention, in which timber, tobacco, and various substances are cut, not by a saw, nor by a knife pressing merely against the substances, but by a knife or knife edge made very sharp, and moved in the manner of a saw, so as, in fact, to constitute a saw (whether band, circular, or any other), but formed without teeth; and a stationary sharpener, consisting either of a piece of bone, steel, or other suitable material, or of a succession of those pieces being applied to the edge of the moving knife, so as to make the knife edge rub against such sharpener set at a proper angle with the edge, whereby the edge is constantly sharpened in the same way in which any knife is sharpened on a hone.

only that in this case the motion is continuous. The inventor employs these circular, band, or reciprocating knives in substitution of saws, to cut timber and other substances; and the cutting is effected with the production of a smooth surface, and without waste; and he also uses such knives or knife edges, moving not merely like a chopper against the substance to be cut endways, but like a saw, to cut tobacco and all kinds of fibrous or other similar substances requiring to be cut cleanly and without jagging.

HYDRO ELECTRIC CABLE.

This is the invention of F. Tomasi, of Paris, France. The cable is composed of one or several pipes of copper or other convenient material, equal in number to that of the despatches it may be desired to transmit simultaneously. Each pipe leads respectively and separately at one end into a little cylinder provided with a piston, and at the other end into a bent glass tube which contains some mercury. A platinum wire, isolated everywhere except at its extremity, which is always immersed in the mercury contained in the tube, is in communication with a terminus or screw nut. Another wire, also of platinum, which can be immersed more or less deeply into the mercury in the glass tube at will, is connected to another similar terminus, and a third wire, also of platinum, isolated everywhere except at its end, is in contact with a third terminus. The last wire is immersed in the glass tube, so that its uncovered end can only come in contact with the mercury at its upper level, The second mentioned terminus is put in contact with the receiving apparatus, and the latter with the pile, which in its turn is connected with the first mentioned terminus.

LUBRICATING OILS.

A Scotch inventor combines caoutchouc with mineral lubricating oils. In preparing the improved mineral lubricating oils, the oil obtained from the destructive distillation of shale at a low red heat, and refined by redistillation and treatment with acids and alkalies, is employed; and it is so far freed from paraffin as to be liquid at, say, 30° to 40° Fah., then refined to the extent which produces an oil of a permanent light yellow color, practically free from pungent odor. In this mineral oil about one per cent of caoutchouc, preferably in the form of sheet india-rubber, is dissolved, and the solution is effected by first allowing the caoutchouc to remain immersed in the oil for a few hours, the oil being, during that time, maintained at a temperature of about 100° Fah.; and, second, by violently agitating the caoutchouc and oil together for about twenty-four hours by means of a mechanically driven dasher or agitator. However, heat alone, or mechanical agitation alone may be used for effecting the solution of the caoutchouc in the oil; a more perfect solution is obtained by employing the methods together. After the solution or combination of the caoutchouc with the oil has been effected, the prepared oil is allowed to settle until it has become clear.

THE PRESENT AND THE PAST.

NUMBER V.

The incredulous reader, who has lived a lifetime by the banks of some swift running and powerful stream, on reading our last contribution, says at once: "Our stream has not sunk its bed, within our recollection, at the utmost more than a few inches, if that; it has not altered its channel more than a few yards; and what it has removed from one place it seems to have redeposited in another; and yet you would have us believe, that these rivers of the West have eaten into the bowels of the earth six thousand feet; have given rise to a series of elevated plains, traversed by endless water-courses; and have carried away rocks not to be estimated by tuns, but thousands upon thousands of cubic miles! It is too incredible; just think for a moment of the time required in such an operation; millions of years will scarce meet the demand! Can you not explain all this by the aid of fractures and dislocations of the strata and by the more energetic and rapid action of the breakers of the sea, while the land was gradually emerging from the ocean?"

No! good reader, we cannot relieve you; the facts of the case forbid a doubt, for Nature, in this instance, has recorded her own method of procedure in unmistakable characters. In the first place, the idea of these water courses being on the line of fissures or dislocations is utterly untenable. The rocks on either side of them are undisturbed, and the very sinuous course of these numberless streams forbids of their being on the line of faults. But the evidence against any action of the sea is, if possible, even still stronger.

Everywhere throughout this region Nature has left monuments to record the progress of her destroying hand. Here and there, harder portions of the rocks eroded have resisted the action of the atmosphere, and stand in fantastic shapes, resembling, as Dr. Newbery remarks, "the forms of churches, castles, gates, and monuments of various kinds." In one locality, a number of such monuments give the idea of a vast cemetery of gigantic tombstones. Had it been the violent action of breakers that had eaten away this land, these monuments had not been left. Do you doubt this statement? Then let us descend with our guide, into the gloomy depths of the cañons, and hear what Dr. Newbery says of these monuments in the early stages of their formation: "Near the mouth of the Diamond River, by the intersections of the numerous cañons which cut the plateau, portions of it have been left in a series of pinnacles and pyramids, frequently standing entirely isolated, forming some of the most striking and remarkable objects seen on our expedition. Many of these buttes exhibit a singular resemblance to the spires and pyramids, which form the architectural ornaments of the cities of civilized nations, except that the scale of magnitude of all these imitative forms is such as to render the grandest monuments of human art insignificant in comparison with them. Oh, man! what becomes of your old churches and castles, your colosseums, and triumphal arches, your ruined cities of the desert, your pyramids, and of the Cyclopean masonry of your lost races, by the side of these, the ruins of an ancient continent?"

But pardon me, reader; you ask, why could not these buttes that our guide describes, have been carved out by the action of breakers? Simply because in the depths of these cañons, even if the sea ever had had access to them, no breaker action could be possible. Visit the fjords of Norway, smaller cañons actually partially submerged, and see the land-locked waters lying these, but harmlessly ruffled by the wildest gale, and you will realize that neither Scandinavian fjords nor Colorado cañons were ever formed by breaker action. And if the buttes below, now forming, do not owe their shapes to any such cause, may we not reasonably infer that the same statement applies to the buttes on the plateau above, long since weathered out, and more completely isolated by longer exposure to atmospheric influences?

But yet another proof. The extensive plateau, marked, in the section we gave in our last, as "the Sage Plains," has been eroded in thick strata of cretaceous shales. These shales represent muddy portions of the Cretaceous sea, which were thickly tenanted by a peculiarly formed characteristic oyster, known to geologists under the name of *gryphæa*. Like other oyster-shells, these are massive and heavy; and Dr. Newbery tells us that, on the Sage plains, these shells occur, strewn over the ground in such numbers that thousands of large ships might be filled with them; these have undoubtedly all fallen from the hundreds of feet of shale that have been removed, the heavy shells resting on the surface, while the lighter particles of earthy matter have been swept away. Now, had breaker action destroyed these beds, these shells would have been ground and reground, and their fragments would have been scattered far and wide; and they thus, in their present disposition, indubitably attest the more gentle nature of the agent that has accomplished this great work of eating away these 1,600 feet of shales.

It is worth our while to cast another glance at the total amount of this erosion. Invert the section we gave in our last, and the empty space between the dotted line and the line describing the present surface will represent the mass of material that has been removed, as a section of a mountain range; a range 6,000 feet in hight, and varying in width from 1 to 180 miles, and with a length of several hundred miles Nor, in reality, does this do full justice to the case; for, to give at all an approximate idea of all this denudation, we ought to have drawn the dotted line from peak to peak, and then continued it over the valleys east and west of the Rocky Mountains and the Wasatch range, but we feared to confuse the reader. And all this work has been accomplished since the close of the cretaceous epoch!

Whither has all this material, thus removed, gone? To form the more recent strata around the Gulf of California, and to furnish material for new strips of land, to be sooner or later upheaved and added to the western edge of our continent; and this appropriately, brings us to the consideration in our next, of the mode in which such materials are re-arranged into new strata.

But we would draw attention to one more question, to which Dr. Newbery gives prominence, and which is well worth remembering, when some tell you that, in our oldest rocks, we see the commencement of geological history.

The materials eroded, as herein described, vast as they are, are as nothing to the vast total of deposits of which they once formed a part. In the Colorado region, we have sections of upwards of 6,000 feet of strata, from some of the oldest, as the silurian, up to the last of the secondary; and these deposits extend between the Colorado and the Mississippi, in a belt 1,200 miles in width, and of "great, though yet unmeasured, extension north and south."

It would have required, according to our guide, all of an island 200 miles in diameter, and at least 6,000 feet high; or, what is more probable, a continent of six times that area, and 1,000 feet high, "to furnish all the sediment that forms the stratified rocks of only that portion of this great central plateau that immediately borders the Colorado."

Where, then, was the continent whose ruin furnished the materials for the whole of the great belt? Do you tell me that fragments of it remain in the north, in Canada, and the Adirondack Mountains? Granted! but these themselves are sediments, altered, it is true, by the vicissitudes of their vast history; and whence came they? Dr. Newbery infers the existence "of broad and rapid rivers, which flowed from the mountains and through the fertile valleys of a primeval Atlantis," bearing down the sediments of our Paleozoic rocks; but what shall we call that utterly lost land, whose destruction must have accompanied the formation of the very oldest ruins, the foundations of this same Atlantis that attest the age of the world? Verily, geology might be termed "man's nescience of creation," wherein he best learns how little he can know.

Paper Wheels.

The Pullman Car Company is running a car, on the Chicago and North-western road, with what are called "paper wheels." The wheels have steel tires and cast-iron hubs, and the paper is introduced in the way of filling under the tires, for the purpose of deadening sound and diminishing the force of concussion. According to the *National Car Builder* the wheels have been running since July last under this particular car, and had been in use some four months previously.

The paper device is said to be superior to wood for the purpose designed, being stronger and lighter, and free from knots, grain, or sap. It does not expand or contract, but remains in the condition in which it is put in the wheels without liability of change. It is cheaper than wood, and can be molded into any form by pressure, and is made fire and water-proof by asbestos. It is, as a substitute for wood, adapted to a variety of uses, especially in the way of ornamentation.

SCIENTIFIC INTELLIGENCE.

A NEW PREPARATION OF THE SULPHOCYANIDE OF AMMONIUM.

A Dutch chemist, Van Zouteveen, has made the important discovery that by passing dry ammoniacal gas through the bisulphide of carbon, a brick-red precipitate forms, which upon solution in water and boiling down to half its original volume, yields sulphocyanide of ammonium. The reaction is a valuable one, as it points out a possible way of making the sulphocyanides in an economical manner. Our readers will recall the uses of this class of salts in testing for iron also in photography, and more recently in the artificial production of cold.

RECOVERY OF IODINE FROM RESIDUES.

When bromine and chlorine are present with the iodine in residues, it is difficult to separate them and to recover the latter; and various methods have been resorted to for the purpose. Beilstein recommends the following: The solution containing the iodine is rendered acid by sulphuric acid; and nitrous acid gas, made from one part starch and six parts crude nitric acid, is passed through it, and the iodine thus precipitated is separated by means of a Bunsen filter. It is then thoroughly washed by cold water, and dried over sulphuric acid. If bromine be in the filtrate, warm the liquid to expel any iodine that may have been dissolved in it, and distil with black oxide of manganese and sulphuric acid. If chlorine be present, it will go off with the bromine. It is said that a considerable portion of the nitrous acid can be reclaimed, after it has served its purpose.

A NEW OPIUM MEDICINE.

We mentioned, some time ago, the discovery of a powerful emetic called apomorphine; we now have to record the preparation of a somewhat analagous base, to which it is proposed to give the name of *apocodein*. When chloride of codein is heated for 15 minutes to 338°—348° Fah., with an excess of a concentrated solution of chloride of zinc, water is eliminated, and apocodein is formed. It cannot be obtained in a crystalline form, but in other respects closely resembles apomorphine, and is more permanent and more easily made than the morphine compound. It is likely to prove a valuable emetic.

NARROW ESCAPE FROM SUFFOCATION BY CHLORINE.

The steamship *England*, which cleared from Queenstown on January 12th, with 200 passengers on board, was obliged to put back to harbor in consequence of the breaking, during a heavy storm, of a number of barrels of bleaching powder in the hold. The heavy sea washed into the ship, and thus liberated the chlorine gas in such quantities as to nearly suffocate all on board. Attempts were made to remove the powder, but it was soon found to be impossible for any one to live in the hold long enough to put on the grappling hooks, and the captain decided to put back to port as fast as he could sail. There are few gases so suffocating as chlorine, and in case of accident to a large quantity of the bleaching powder, the lives of all on board ship would be greatly imperiled. We have frequently observed the fumes of chlorine, while passing through some of the lower business streets of the city, and have been surprised at the endurance of persons employed in certain localities. There is too much carelessness in handling an article that is capable of so much mischief.

RECENT DECISIONS AT THE PATENT OFFICE.

The Examiners-in-Chief at the Patent Office make the following report to the Acting Commissioner of Patents, in relation to the application for an extension of a patent to John Worsley, granted December 23, 1856, on the use of corn husks in manufacturing rolls for calenders, washing machines, etc.

"The invention at most was but the substitution of one known material for another, or others. It is admitted that cotton, paper, wood, rags, or cloth, etc., had formerly been used for precisely the same purpose, and probably a list might be made out, of a hundred other materials, embracing grasses, leaves, mosses, barks, etc., etc., which would be the full equivalents of husks for the purpose named. It is true that when one discovers some quality in a particular material, peculiarly adapting it to some important use not thought of before, whereby art is improved, and the public benefited, he should be rewarded with the monopoly of its use for a proper time. But this class of discovery is generally among the least meritorious.

"Artisans and manufacturers should not be improperly trammeled, but left as far as possible, consistent with the clear rights of inventors, free in the choice of material wherewith to ply their trades and carry on their occupations. To allow patents for each supposed step of improvement, where it consisted in the mere use of skill and good judgment in the selection of material, would embarrass rather than promote manufactures and arts.

"But in the case before us, the Hon. Commissioner of Patents, Judge Mason, for whose opinion we have great respect, decided the matter to be patentable; but added, as a sort of solace to his own conscience, 'If it be a valueless invention, a patent can harm no one; if it be valuable, it is patentable.' The applicant has had an opportunity of testing its value by going with it before the public for fourteen years, and though he swears that he has used extraordinary diligence in introducing it, yet a less number of his 'superior and cheaper' rolls were demanded in the last than in the second and fourth years of his patent.

"He states that he has made a profit of $5,975 in manufacturing his rolls, from which he deducts $3,500 as about the amount expended in 'traveling expenses, advertising, circulars, and incidental expenses in introducing the invention.'

"This is too indefinite to be admitted as a set-off, and we must conclude that he has been sufficiently rewarded for having discovered that husks are suitable for the purposes claimed.

"The claim that the invention is of any value to the public is only supported by two general affidavits of persons using the rolls, and think them superior to any in use, though what knowledge they possess in regard to other rolls does not appear.

"There is no proper detailed statement, or any other proper showing of the value of the patent, and we think the extension should be refused.

"R. L. B. CLARKE, }
"S. H. HODGES, } Examiners-in-Chief.
"J. M. THACHER, }

DECISION.

The reasons assigned by the examiners-in-chief for the adverse report upon the merits of the present application are deemed good, and the extension is accordingly refused.

DUNCAN, Acting Commissioner.

The Acting Commissioner makes the following report, in relation to an application for the extension of letters patent, of John B. Read, for an improved projectile for ordnance, granted October 23, 1856.

The invention to which this application relates is an expanding wrought-iron sabot for elongated shot and shell. Various modes are suggested by which the hollow cylinder constituting the sabot may be attached to the projectile, but the preferred mode is by imbedding it more or less in the cast

metal of which the latter is composed. The cylinder is made thin toward its free end, so that when the charge, which is partially enveloped by it, is fired, the cylinder will be expanded and forced tightly against the walls and into the rifled grooves of the gun.

From the examiner's report it appears that lead, molded into a similar form, and similarly attached, had previously been proposed for an expanding sabot upon heavy projectiles.

It is beyond question, however, that Read produced largely superior results by the substitution of the wrought iron; and his experiments doubtless had much to do with demonstrating the feasibility of using the hard metals for the expanding sabots of rifle projectiles, and thus insuring the success of rifled ordnance of large caliber. His net receipts in excess of cash expenditures are about ten thousand dollars; but in stating this no allowance is made for nearly three years time devoted to the conducting of experiments at a point distant from his place of residence, and for the consequent serious interruption of his professional practices.

In view of the importance of the invention the inference is justified that the petitioner has not been reasonably remunerated. This evidently is the judgment of the Committee on Military Affairs and the Militia in the Senate of the United States, by whom, at the last session of Congress, a report was made upon a memorial of Dr. Read, asking for compensation for his invention, in which report they recommend an appropriation of seventeen thousand dollars "as remuneration for the use of his (Read's) improvements, and as indemnity for his actual expenses in perfecting them, as well as for the time and attention devoted to them."

Congress, as endowed with the supreme legislative function of the land, has an undoubted right to vote any specified sum by way of compensation to an inventor, and, if it so choose, to take action in the premises without regard to the diligence which the inventor may have displayed in his efforts to introduce his improvements. But Congress has delegated no such power to the Commissioner of Patents. This officer is only authorized to extend a patent when he is satisfied, among other things, that the failure to receive reasonable remuneration has been without neglect or fault on the part of the inventor. I do not think the facts in the present case warrant this inference. The inventor, to be sure, displayed unusual diligence during the first four years of the patent, up to the time of the breaking out of the late civil war. But during the progress of the war, at the very time when he should have been at work aiding the Government in the further experiments necessary to the full demonstration of the merits of the invention, and when his services in this direction would, from the very nature of things, have received from the Government immediate recognition, and, it is reasonable to believe, a measure of compensation fully equal to what, under any circumstances, he could be entitled to receive; at this important juncture, this harvest time for inventors in this branch of improvements, Read withdraws from all connection with the Government, under whose auspices his previous experiments had been conducted, and casts in his lot with the pretended government of the rebellion. The very patent which he offers for extension bears upon it the certificate and seal of the so-called Confederate States government, affixed thereto in August, 1861; which shows that Read deemed it of more importance to prevent a forfeiture of his patent under rebel laws than to introduce his invention under the protection of the laws of that government which alone it was his duty as well as his interest to aid and obey. There can be but little doubt that if he had remained true to his country instead of espousing the cause of the rebellion, he would have been enabled, by reason of his established relations with the Government and the widespread introduction of his invention effected by the war, to derive, from the original term of the patent an adequate remuneration for all the time, ingenuity, and expense bestowed upon the invention and its introduction into use.

For his great mistake in this regard he has no one to blame but himself. The presumption is that he intelligently resolved to forego the superior opportunities which he must have known a course of loyalty would insure him, and with equal deliberation accepted the uncertainties in which his erratic course involved him. He cannot be permitted now to plead that this action involved no fault on his part, and that in thus deserting his country in her hour of peril he was guilty of no neglect of the rights secured to him by his patent.

I am constrained to hold that his failure to receive the remuneration to which he deems himself entitled under his patent, has arisen mainly from his own fault and neglect, and I am therefore powerless to afford him the relief which he now asks. The extension must be refused.

DUNCAN, Acting Commissioner.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 1·00 a line, under the head of "Business and Personal."

All reference to back numbers must be by volume and page.

H. & R., of Ontario.—The amount of air to be admitted, through perforated pipe at back of the bridge wall, across a boiler furnace, to effect perfect combustion, will vary according to circumstances. Provision should be made for maximum admission, and regulating the same down to a point where just enough air is admitted to consume the smoke and no more. Every pound of air admitted beyond this point will result in loss of heat. Therefore we advise you to err on the safe side, if you err at all, by making the admission free, and the perforations in the pipe numerous and of good size. We cannot even approximate to proportions, as you give no data, but you need not fear to go ahead with the work, if you do not stint the capacity for the admission of air. With a good damper you can control it perfectly, and get good results.

A. J. H. & Co., of Mass.—We have never seen any iron so badly scaled or incrusted with oxide, that it could not be cleaned with a solution of one part sulphuric acid in ten parts water. Paradoxical as it may seem, strong sulphuric acid will not attack iron with anything like the energy of a solution of the same. On withdrawing the pieces from the weak solution of acid, they should be dipped in a bath of hot lime water, and held there till they become so heated that they will dry immediately when taken out. Then if they are rubbed with dry bran or sawdust, there will be an almost chemically clean surface left, to which zinc will adhere readily. We think you have been using too strong acid.

T. G., of N. Y.—The brown powder collecting on the zinc of your Daniell's battery, is a oxide of copper deposit. This deposit and the copper deposit on the surface of the cup cannot be wholly avoided, but, according to Pope, it may be greatly lessened, by suspending the zinc so that it will not touch the porous cup below the surface of the liquid, and by saturating the bottom of the porous cup to the hight of half an inch with paraffin. For answers to your other queries, we refer you to standard treatises on electricity. We cannot give space to them here.

M. L. W., of N.—If a pipe containing water have its lower end open beneath the surface of mercury, upon opening the upper end of the pipe, the water will fall in the pipe and bubble up to the surface of the mercury, until the column in the pipe just balances the pressure of the mercury, when the flow will cease. The specific gravity of mercury at 60° Fah., is 13·56, water being 1. We cannot give you its price per pound.

F. X. L., of Md.—There are many flexible transparent substances beside isinglass (mica). Thin plates of gelatin, or horn, films of collodion, tracing paper such as is used by artists, are articles which we think might some of them answer your purpose.

RESTORING THE COLOR OF GOLD AFTER SOLDERING.—Let R. R. boil the gold, after soldering, in diluted oil of vitriol; rinse in clean water, polish with tripoli mixed in oil (sweet oil is best), wash and gloss with crocus on a clean cloth.—C. J. C., of Iowa.

BORING OUT SEGMENT OF CYLINDRICAL RING.—Having published a practical method for performing the above work, we take this means of notifying correspondents that their communications upon this subject are no longer of value. We cannot undertake to reply to this effect to each personally. We have on hand a number of designs, few of which are practical, and none of which we shall use. We are much obliged to all for their attention, and shall be glad to hear from them on any other practical subject within the scope of the SCIENTIFIC AMERICAN.

TO FASTEN CHAMOIS AND OTHER LEATHER TO IRON AND STEEL.—Dr. Carl W. Heinischen, of Dresden, gives the following recipe for the above purpose: "Spread over the metal a thin, hot solution of good glue; soak your leather with a warm solution of gallnuts before placing on the metal, and leave to dry under an even pressure. If fastened in this manner it is impossible to separate the leather from the metal without tearing it.—G. E. M., of Texas.

R., of Va.—You will find information in regard to windmills in Craik's "Practical Millwright and Miller," published by Henry Carey Baird, Philadelphia, Pa.

J. H. W., of Cal.—The density of proof spirits is not materially affected by pressure, and the hydrometer would show the same results on the mountain as in the valley.

Business and Personal.

Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

Queries.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers, and hope to be able to make this column of inquiries and answers a popular and useful feature of the paper.]

1.—SILVER GILT MOLDINGS.—I wish a recipe for making silver gilt moldings to imitate gold.—N. B.

2.—CORE OVEN.—What is the best plan upon which to construct a core oven, to dry and bake cores, for all kinds of core work where bituminous coal is used? I find cores very expensive, and would like the most economical plan of doing this kind of work.—W. M. J.

3.—SILVER SOLDER.—How can I make an easy flowing silver solder, suitable for joining saw blades and other thin plate?—C. P.

4.—CRYSTALLING GLASS FRONTS.—How can I produce a crystalline surface on glass for shop fronts, church windows, etc., that will withstand the action of frost?—G. H. W.

5.—LETTERING STEEL PLATE.—I wish a method of transferring letters or designs to the surface of steel plate, that may be used instead of the old method of coating with wax. My impression is that there is such a process, in which the work is facilitated by the use of an elastic tamp.—J. G. H.

6.—GLUE.—I would like to have a recipe for a rapidly hardening and tenacious glue for fastening pine cones, etc., to wood, in making fancy picture frames. If you or your readers know of any such, please give it in your valuable journal.—J. F. K.

7.—MIXING IRON.—I am having considerable trouble in mixing iron. The metal I use is old car wheels with chilled rims. I use about twenty-five per cent of No. 1 Scotch pig to soften with, but it does not appear to mix. Parts of the castings are soft, and others hard. Can some of your correspondents suggest the cause and remedy?—G. H. P.

8.—JOURNAL OF MILL SPINDLE.—What substance shall I use for filling the cast iron journals for the spindle of a grist mill to run in? None of the anti-friction metals will answer, because the poisonous particles worn off pass into the meal.—H. A. S.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

APPLICATIONS FOR LETTERS PATENT.

184.—LIQUID METER.—José Francisco de Navarro, New York city. January 24, 1871.

206.—PRINTING PRESSES.—Earle Henry Smith, New York city. January 26, 1871.

209.—SEWING MACHINE.—Henry Graham Thompson, New York city. January 26, 1871.

212.—STEAM BOILER.—Jacob Lorillard, New York city. January 26, 1871.

231.—BALE TIES.—John Scott Leng, New York city. January 28, 1871.

234.—OLEAGINOUS COATING FOR WALLS AND CEILINGS.—Charles F. Kemmer, Cleveland, Ohio. January 28, 1871.

235.—PILLOWS, BOLSTERS, ETC.—Timothy S. Sperry, Chicago, Ill. January 28, 1871.

237.—VESSELS FOR VOLATILE OILS, SPIRITS, ETC.—Meissner, Ackermann & Co., New York city. January 30, 1871.

240.—PADLOCKS.—William H. Atkins, Ithaca, N.Y. January 30, 1871.

245.—COMBS FOR WORSTED MACHINERY.—Charles Weller, Philadelphia, Pa. January 30, 1871.

NEW BOOKS AND PUBLICATIONS.

GINX'S BABY: His Birth and other Misfortunes.

This book is a satire, cleverly written, to show up the modern baby question that so nearly concerns us all, and in respect to which there are diverse opinions and practices. The contents discuss "What Ginx did with him," "What Charity and the Churches did with him," "What the Parish did with him," "What the Clubs and the Politicians did with him," and "What Ginx's Baby did with himself." It is a very humorous book, and is published by George Routledge & Son, 416 Broome street, New York.

THE CONVERSION OF ST. PAUL. By Geo. Jarvis Geer, D.D. One vol., 12mo., 80 pp. New York: S. R. Wells, 389 Broadway.

The book is handsomely printed on toned paper, bound in fancy muslin beveled boards, and is sold at $1. Plain Edition, 75 cents.

LIFE OF JOHN J. CRITTENDEN.

Messrs. J. B. Lippincott & Co., of Philadelphia, announce their purpose to publish the life of this deceased statesman, edited by his gifted daughter, Mrs. Chapman Coleman, provided a sufficient number of subscribers can be obtained. The proposed work will embrace two large 8vo. volumes. Price, $5 each. The work will be one of great value to all who feel interested in the political history of the times of Crittenden and his contemporaries.

THE LOVER'S LIBRARY.

J. S. Redfield, No. 140 Fulton st., N. Y., proposes to publish a popular series of sentimental stories, under the above caption, the first volume having appeared. It contains the "Devil's Pool," by George Sand; "The Story of Leonard and Margaret," from Southey's "Doctor"; "The Maid of Malines," by Bulwer, and "Patty's Revenge." Price, in paper cover, 50 cts.

THE ALDINE PRESS, for February, is a splendid number. It contains eight very fine illustrations, three of which are full page. With this number is also a handsome oil chromo, "Ducks," which is sent as a premium, with the paper, for $2·50. As a specimen of typography, the "Press" is an honor to American art.

THEODORE TILTON, having retired from the editorship of the *Independent*, proposes to start a new paper, to be called "The Golden Age," to be devoted to the free discussion of all living questions in Church, State, Society, Literature, Art, and Moral Reform. Price, $3·00 a year. Mr. Tilton's address is box 2,848, New York city.

APPLICATIONS FOR EXTENSION OF PATENTS.

METHOD OF SECURING THE DOORS OF HAY PRESSES, ETC.—Cornelius Martrati, Waterford, N. Y., has petitioned for an extension of the above patent. Day of hearing, April 5, 1871.

GRINDING SAWS.—Daniel S. Nippes, Upper Merion Township, Pa., has petitioned for the extension of the above patent. Day of hearing, April 5, 1871.

WHIFFLETREE HOOKS.—Ann M. Cooley, Ceresco, Mich., has petitioned for an extension of the above patent. Day of hearing, June 14, 1871.

MACHINE FOR MAKING PAPER BAGS.—Roxanna Rice, South Lancaster, Mass., has petitioned for an extension of the above patent. Day of hearing April 12, 1871.

SEWING MACHINE.—James E. A. Gibbs, Steels Tavern, Va., has petitioned for an extension of the above patent. Day of hearing May 17, 1871.

HARVESTERS.—Charles Crook, New Hope, Pa., has petitioned for an extension of the above patent. Day of hearing, April 19, 1871.

CORN HUSKERS.—Evelyn F. French, New York city, has petitioned for an extension of the above patent. Day of hearing, April 26, 1871.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

MEDICAL COMPOUND.—Henry Lister, Houston, Texas.—This invention and discovery relates to a new and valuable remedy for chills and fever, and consists in the use of what is commonly known as iron weed (botanical name, "*verbena urtic(folia*") macerated and combined with alcohol.

ARTIFICIAL LEG.—James E. Hanger, Staunton, Va.—This invention relates to improvements in the construction of artificial legs, and it consists in certain arrangements of the knee, ankle, and toe joints, which are designed to provide more efficient and durable legs than those now in use.

LEACHING APPARATUS.—H. C. Crowell, Morgan, Ohio.—This invention relates to a new and useful improvement in apparatus for leaching bark in the process of tanning leather, and for all other similar purposes, and it consists in warming and producing a circulation of the liquid by means of a current of steam.

ASH SIFTER.—William Weaver, Greenwich, N. Y.—This invention has for its object to furnish an improved sifter for sifting ashes, coals, and other substances, which shall be so constructed as to prevent the escape of dust or ashes, thus adapting it for use in a room, yard, or other place where the dust would be a nuisance, and which shall at the same time be simple in construction, and conveniently operated.

STEP AND TRAM BOX.—William G. Norment, Dyersburgh, Tenn.—This invention relates to a new and useful improvement in step boxes for supporting and adjusting the step ends of mill spindles and upright shafts, and consists in a sectional step box, the sections of which box are so arranged on the step point of the spindle or shaft that the step end of the spindle or shaft may be moved laterally by means of a series of set screws.

COMBINED KEY RING AND DOOR FASTENER.—Bryant H. Melendy, Manchester, N. H.—This invention has for its object to improve the construction of the improved key ring and door fastener, patented by the same inventor May 17, and July 19, 1870, and numbered 103,088 and 105,474, so as to make it lighter, stronger, smaller, and better, and thus more convenient and effective in use.

POST HOLE DIGGER.—A. E. Lindsley, Paw Paw, Mich.—This invention relates to a new instrument for digging the holes for fence posts and other purposes, and consists in the application of a circular cutter and vertically adjustable clamping block, by which the earth or sand is secured in the tubular case on which the cutter is formed.

COFFEE MILL.—Francois Raymond, Woodhaven, L. I.—This invention relates to improvements in coffee mills, and it consists in an improved construction of the stationary grinder, and the hopper and rotary grinder support calculated to simplify and cheapen the cost of attaching the parts to the box top, and together, as hereinafter described.

CORN PLANTER.—J. M. Parsons, Charles City, Iowa.—This invention has for its object to furnish a convenient and reliable corn planter, which shall be so constructed that one man with two horses can plant the corn, two rows at a time, in accurate check row, upon ground just as it is left by the plow, and without its being marked or staked out.

WASHING MACHINE.—W. G. Jones, Marshall, Texas.—This invention has for its object to furnish an improved washing machine, which shall be so constructed as to do its work quickly and thoroughly, however soiled the garments may be, and which will wash the most delicate fabrics without injuring them.

BEDSTEAD.—George Snowden, Hudson, N. J.—This invention relates to a new construction of bedstead frame and bed bottom, and has for its object to provide an elastic couch, and reduce the expense of making the same.

REVERSIBLE BROILER.—Levi H. Colborne and David H. Lowe, New York city.—This invention has for its object to furnish an improved broiler, which shall be so constructed as to catch and preserve the gravy, and allow the substance being broiled to be reversed or turned without removing the broiler, or allowing the gravy to run into the fire, and which shall at the same time be simple in construction, and convenient in use.

HAY RAKE AND LOADER.—John E. Fell and John H. Mattocks, Maquoketa, Iowa.—This invention has for its object to furnish a simple and convenient machine, that may be conveniently attached to the rear part of the wagon upon which the hay is to be loaded, and which will rake or collect the hay, and raise and deposit it upon the said wagon.

CULTIVATOR.—Marshall Sattley, Taylorville, Ill.—This invention has for its object to furnish an improved cultivator, simple in construction, strong, durable, not liable to get out of order, and effective in operation.

COMBINED FENDER AND GAGE WHEEL.—Alexander B. Thornton, New Berlin, Ill.—This invention has for its object to furnish an improved fender for protecting the plants from being covered and injured by having too much dirt thrown around or over them, and which shall at the same time be so constructed as to serve as a gage wheel to regulate the depth at which the plow works in the ground.

APPARATUS FOR CHARGING WOODS WITH PRESERVING LIQUIDS.—Wm. H. Smythe, Steubenville, Ohio.—This invention relates to improvements in apparatus for forcing preserving liquids into woods, and it consists in a combination of an air pump, liquid receptacle, and compression chamber, and an attaching device for connection to the wood or to a tank adapted for the employment of compressed air, or other equivalent gases for forcing the liquids in.

BLIND REGULATOR.—John T. O'Donoghue and Alex. Leavitt, New York city.—This invention relates to improvements in window blinds, and it consists in the application, to one or more of the slats, of a notched wheel, and one or more spring holding pawls to the stile, for holding the slats in any position in which they may be set, by turning them on their bearings, for closing or opening, to exclude or admit the light.

LEATHER PUNCHING AND FEEDING MACHINE.—Wm. Barrey, Carthage, N. Y.—This invention relates to improvements in machinery for holding, punching, and feeding leather for hand sewing, and consists in a reciprocating punching awl and pair of feeding rollers, a ratchet feeding mechanism and a foot power motion, combined in a simple attachment, which may be applied to a shoemaker's, harness maker's, or other leather worker's bench, in a way to be conveniently operated by the foot, to hold the leather, punch, and feed it along while the threads are passed through by hand, by which the work may be done very much faster than by the common way of hand sewing.

IMPROVED MODE OF REMOVING SLAG.—John Thomas, Hokendauqua, Pa.—This invention relates to an improved mode of removing the slag used in furnaces as a flux, after it has performed its office and is allowed to flow out; and it consists in running the slag, while in a fluid state, into a strong current of water, which, by its chemical action on the lime contained in it, disintegrates the slag or liquid cinder, so that it will flow along with the current to some convenient place of deposit.

ANIMAL TRAP.—Ebenezer Oliver, New York city.—This invention has for its object to improve the construction of rectangular wire animal traps, so as to make them stronger, more durable, less liable to get out of order, less liable to frighten the animal trapped for, and more convenient in use.

WATER CUT-OFF.—Rufus M. Bixby, Iowa City, Iowa.—The object of this invention is to provide a cheap and convenient instrument by which water or other fluid may readily be cut off from one pipe and made to flow into another.

SEWING MACHINE SEAT.—Sarah A. Sexton, New York city.—This invention relates to a new and useful improvement in a seat for sewing machines, and consists in connecting the same with the machine, and in making it adjustable.

Official List of Patents.

ISSUED BY THE U. S. PATENT OFFICE.

FOR THE WEEK ENDING FEB. 14, 1871.

Reported Officially for the Scientific American.

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On each Caveat	$10
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A sketch from the model or drawing, relating to such portion of a machine as the Claim covers, from $1
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MUNN & CO.,
Patent Solicitors, 37 Park Row, New York.

111,714.—SEAT FOR VEHICLES.—D. R. Allen, Cumberland Me.

111,715.—COMPASS JOINT.—Theodore Alteneder, Philadelphia, Pa.

111,716.—LEATHER TO RESEMBLE CLOTH.—Moritz Altmann Baltimore, Md.

111,717.—RECEPTACLES FOR STATIONARY ARTICLES, ETC.—W. F. Baade, Buffalo, N. Y.

111,718.—VENTILATOR.—G. R. Barker, Philadelphia, Pa.

111,719.—LEATHER PUNCHING AND FEEDING MACHINE.—William Barry, Carthage, N. Y.

111,720.—WATER CUT-OFF.—R. M. Bixby, Iowa City, Iowa. Antedated Feb. 3, 1871.

111,721.—STEAM RADIATOR.—G. W. Blake, New York city.

111,722.—REFRIGERATING OYSTER CAN.—Alfred Booth, Chicago, Ill.

111,723.—CURTAIN FIXTURE.—C. M. Brown and C. L. Gates, Hartford, Conn.

111,724.—COMPOSITION FOR PAVEMENTS.—C. P. Burgess and J. R. Stevenson, Rochester, N. Y.

111,725.—STUMP EXTRACTOR.—E. W. Cady, Tomah, Wis.

111,726.—SEED SOWER.—G. A. Carman, Deer Park, N. Y.

111,727.—DRAIN TILE.—A. W. Conley, Economy, Ind. Antedated Feb. 2, 1871.

111,728.—SASH BALANCE.—J. M. Connel, Newark, Ohio.

111,729.—STATIONARY BELL HOLDER.—Sylvester Croll (assignor to S. J. Phillips), Philadelphia, Pa.

111,730.—APPARATUS FOR LEACHING BARK, ETC.—H. C. Crowell, Morgan, Ohio.

111,731.—ORNAMENTING MIRRORS.—W. M. Davis, Mount Sinai, assignor to himself and S. B. Norton, Brooklyn, N. Y.

111,732.—NIGHT LATCH.—C. C. Dickerman, Boston, Mass. Antedated Feb. 4, 1871.

111,733.—WEIGHING SCALES.—Franklin Fairbanks and Harvlin Paddock, St. Johnsbury, Vt.

111,734.—TREATING BLOOD FOR THE MANUFACTURE OF FERTILIZERS.—L. S. Fales (assignor to the American Fertilizing Company) New York city.

111,735.—HAY LOADER.—J. E. Fell and J. H. Mattocks, Maquoketa, Iowa.

111,736.—DRILL REST FOR TURNING LATHES.—H. H. Folsom, assignor to C. A. Chase), Lowell, Mass.

111,737.—PURIFIER, CONDENSER, ETC., FOR GAS WORKS.—Andrew Fulton, Albany, N. Y.

111,738.—PRUNING SHEARS.—E. D. Gaines and J. A. Mechillen, Chicago, Ill.

111,739.—COTTON PRESS.—J. B. Gridley, Louisville, Ky., assignor of one third his right to Robert Patterson and Chauncy Rice Antedated Feb. 2, 1871.

111,740.—INTERFERING PAD FOR HORSES.—W. H. Hall, Boston, assignor to himself and J. W. Haskins, Charlestown, Mass.

111,741.—ARTIFICIAL LEG.—J. E. Hanger, Staunton, Va.

111,742.—AIR PUMP.—C. B. Hardick, Brooklyn, N. Y.

111,743.—EXTRACTING TURPENTINE FROM TREES.—B. I. Hazard, Georgetown, S. C.

111,744.—BARK MILL.—John Helenbrook, Olean, N. Y.

111,745.—ANIMAL TRAP.—A. A. Hotchkiss, Sharon, Conn.

111,746.—ADJUSTABLE BEVEL.—L. D. Howard, St. Johnsbury, Vt.

111,747.—CLOTHES DRYER.—L. D. Howard, St. Johnsbury Vt.

111,748.—PUMP.—John Humphrey, Keene, N. H., assignor James Wilson, Bridgeport, Conn.

111,749.—LITHOGRAPHIC PRESS.—Thomas Hunter, Philadelphia, Pa.

111,750.—WASHING MACHINE.—W. G. Jones, Marshall Texas.

111,751.—RUBBER ROLLER FOR PAPER MACHINES.—R. A. Kelty, Lambertville, N. J. Antedated Jan. 30, 1871.

111,752.—SEWING MACHINE.—E. A. Kimball, Abingdon Mass.

111,753.—BASE-BURNING FIRE-PLACE HEATER.—Philip Klotz (assignor to B. C. Bibb), Baltimore, Md.

111,754.—COMBINATION TOOL.—J. B. Lamkin, Champaign, Ill.

111,755.—WAGON HOUND COUPLING BOX AND PLATE.—W. J. Lewis, Pittsburg, Pa.

111,756.—RUBBER BLOCK HOLDER FOR WAGON BRAKES.—W. J. Lewis, Pittsburg, Pa.

111,757.—POST-HOLE DIGGER.—Aaron E. Lindsley, Paw Paw Mich.

111,758.—BUTTER TUB, ETC.—William Marsh, Waterford Penn.

111,759.—BAKER'S OVEN.—Alexander Martin, Allegheny, Pa

111,760.—MILLSTONE FEEDER AND GRAIN SCOURER.—P. H. Massey, South Bend, Ind.

111,761.—STEAM LAND CARRIAGE.—Jerome B. McKinley, Spencer county, Ky.

111,762.—COMBINED KEY RING AND DOOR FASTENER.—B. H. Melendy, Manchester, N. H.

111,763.—PUMP VALVE.—Chas. L. Merrill, Watertown, N. Y Antedated February 13, 1870.

111,764.—PLOW BEAM.—Samuel Holden Miller, Hamilton, Ill.

111,765.—MACHINE FOR MAKING CANDY.—Thomas Mills and George H. Mills, Philadelphia, Pa.

111,766.—RIDDLE AND THRASHING MACHINE.—Daniel Murphy (assignor to himself and Timothy C. Murphy), Dubuque, Iowa.

111,767.—CAR COUPLING.—James W. Musser and Ralph Carkhuff, Lewisburg, Pa.

111,768.—STEP AND TRAM-BOX FOR MILL SPINDLES.—W. G Norment, Dyersburg, Tenn.

111,769.—HAND-WASHING RUBBER.—Elwood R. Norny McDonough, Del.

111,770.—BLIND-SLAT REGULATOR.—John T. O'Donoghue and Alexander Leavitt, New York city.

111,771.—ANIMAL TRAP.—Ebenezer Oliver, New York city.

111,772.—ROLLED BAR FOR NUT BLANKS.—Henry W. Oliver, Jr., Pittsburgh, Pa.

111,773.—STAMP CANCELER.—Amos D. Owen, Thorntown, Ind.

111,774.—CORN PLANTER.—John M. Parsons, Charles City, Iowa.

111,775.—SUPPORTING CORES.—Enos B. Phillips, Cambridge, Mass.

111,776.—ADJUSTABLE ATTACHMENT OF CAMS FOR FLIERS OF PRINTING PRESSES.—Charles Potter, Jr., Plainfield, N. J.

111,777.—CLOTHES AND HAT HOOK.—Reuben W. Randall, Biddeford, Me.

111,778.—COFFEE MILL.—François Raymond, Woodhaven, N. Y., assignor to the Lalance and Grosjean Manufacturing Company, New York city.

111,779.—MACHINE FOR CLEANING AND SCOURING WHEAT.—Ephraim Russell, Minneapolis, Minn.
111,780.—GATE.—Cyrus W. Saladee, St. Catharines, Canada.
111,781.—CULTIVATOR.—Marshall Sattley, Taylorville, Ill.
111,782.—SEWING-MACHINE SEAT.—Sarah A. Sexton, New York city.
111,783.—WEAVING TUBULAR FABRICS.—Guilford Smith, South Windham, Conn.
111,784.—APPARATUS FOR INJECTING PRESERVATIVE LIQUIDS INTO WOOD.—William H. Smith, Steubenville, Ohio.
111,785.—BEDSTEAD.—George Snowden, Hudson, N. J.
111,786.—PRAIRIE-PLOW JOINTER.—Andrew J. Spicer, Galesburg, Mich.
111,787.—EXCAVATOR.—Thomas Symonds (assignor to John B. Curtis), Portland, Me.
111,788.—MACHINE FOR CUTTING CHEESE, BUTTER, ETC.—James H. Thomas, Lynn, Mass.
111,789.—REMOVING SLAG FROM FURNACES.—John Thomas, Hokendauqua, Pa.
111,790.—COMBINED FENDER AND GAGE WHEEL.—Alexander B. Thornton, New Berlin, Ill. Antedated February 11, 1871.
111,791.—APPARATUS FOR THE TREATMENT OF ALCOHOLIC AND OTHER SPIRITS.—Reuben D. Turner, New York city.
111,792.—METHOD OF ATTACHING HANDLES TO SAWS.—Samuel W. Valentine (assignor to Porter Saw Company), Bristol, Conn.
111,793.—DOUBLE-SHOVEL PLOW.—Robert Paten Van Horne, Gratiot, Ohio.
111,794.—SMUT AND WHEAT-SEPARATING MACHINE.—Wm. H. Wash, Howardsville, Va. Antedated February 1, 1871.
111,795.—ASH SIFTER.—William Weaver, Greenwich, N. Y.
111,796.—MACHINE FOR BUNDLING WOOD.—Wm. L. Williams, New York city.
111,797.—PAPER-TRIMMING MACHINE.—William P. Yeoman, Waukegan, Ill.
111,798.—CHEWING GUM.—Thomas Adams (assignor to John D. Adams), Hudson City, N. J.
111,799.—SULKY ATTACHMENT FOR BREAKING PLOWS.—Asa H. Allison, Charlottesville, Ind.
111,800.—TOBACCO PRESS.—Herman H. Alms, Kansas City, Mo.—Antedated February 3, 1871.
111,801.—TYING BROOMS AND BRUSHES.—James H. Anderson, Terre Haute, Ind., assignor to Thomas Marston, Jr., Walter L. Peck, and Clarence I. Peck, Chicago, Ill.
111,802.—PAPER-BAG MACHINE.—Charles F. Annan, Boston, assignor to himself and Herbert S. Merrill, Cambridge, Mass.
111,803.—PAPER-BAG MACHINE.—Charles F. Annan, Boston, assignor to himself and Herbert S. Merrill, Cambridge, Mass.
111,804.—DEVICE FOR LABELING CIGARS.—Reuben H. Andrews, Washington, D.C.
111,805.—PRINTING PRESS.—Amos H. Bangle, Brooklyn, Cal.
111,806.—CONCRETE FOR PIPES, BRICKS, ETC.—Thomas J. Barron, Brooklyn, E. D., N. Y.
111,807.—BED BOTTOM.—Van Bell, Seville, Ohio.
111,808.—CORN PLANTER.—Cyrus F. Bilhimer, Irwin's Station, Pa.
111,809.—SPRING SUPPORTER FOR CARRIAGES.—Daniel H. Brown, Utica, Mo.
111,810.—MILLSTONE PICK.—Henry J. Brunner, Nazareth, Pa.
111,811.—COOKING STOVE.—Esek Bussey, Troy, N. Y.
111,812.—COOKING STOVE.—Esek Bussey, Troy, N. Y.
111,813.—LAMP BRACKET FOR SEWING MACHINES.—Henry Campbell, San Francisco, Cal.
111,814.—BREECH-LOADING FIRE ARM.—Martin J. Chamberlain, Springfield, Mass.
111,815.—APPARATUS FOR THE MANUFACTURE OF BESSEMER STEEL.—Henry Chisholm, Cleveland, Ohio.
111,816.—LET-OFF MECHANISM FOR LOOMS.—John Clegg, Warwick, R. I.
111,817.—MACHINE FOR THE MANUFACTURE OF MOLDINGS.—Joseph C. Cooke and Henry A. Whiteley, Preston, Conn.
111,818.—ROTARY STEAM ENGINE.—Philipp Cramer, Providence, R. I.
111,819.—FEED CUTTER.—John Criley, Shiloh Hill, and Whitney Gilbreath, Rockwood, Ill.
111,820.—APPARATUS FOR SMOOTHING AND PRESSING PAPER DURING THE MANUFACTURE.—Daniel Crosby, Hampden, Me.
111,821.—DENTRIFICE.—Oliver Danforth, Bibb county, Ga.
111,822.—HUB AND AXLE.—Carlos R. Donner, Sonora, Cal.
111,823.—SHELL FUSE.—Ellis Drake, Stoughton, assignor to himself and John S. Smith, Leicester, Mass.
111,824.—RAILWAY ALARM.—George Draper, Hopedale, Mass.
111,825.—GAS BURNER.—Antoine Ernest Dupas, New Orleans, La.
111,826.—CORN PLANTER.—Arthur Edwards, Cuba, Miss.
111,827.—MAGAZINE FOR BREECH-LOADING FIRE ARMS.—Wm. H. Elliott, New York city.
111,828.—SPOOL-SILK CASE.—Samuel Elmer, Ashtabula, Ohio.
111,829.—GAGE FOR SAW FILER.—James E. Emerson, Trenton, N. J.
111,830.—TRAVELING TRUNK.—Harry Hubbard Evarts, Chicago, Ill. Antedated February 4, 1871.
111,831.—FENCE.—Osker F. A. Faulkner, Mount Pleasant, Iowa.
111,832.—BEDSTEAD AND BED BOTTOM.—Frederic G. Ford, Baltimore, Md. Antedated February 10, 1871.
111,833.—TACKLE FOR HOISTING SAILS.—George A. Ford, Oswego, N. Y.
111,834.—MORTISING MACHINE.—Joseph W. Fowle, Boston, Mass.
111,835.—GRIDDLE.—Titus D. Gail, Waukegan, Ill.
111,836.—FIRE EXTINGUISHER.—Joseph Gardner, Bedford, Ind.
111,837.—MACHINE FOR NAILING SHOE SOLES WITH WIRE.—Louis Goddn (assignor to Elmer Townsend), Boston, Mass.
111,838.—WATER METER.—Robert C. Gray and William B. Brittingham, LaFayette, Ind.
111,839.—CHIMNEY TOP.—Richard W. Griffith, Georgetown, D.C.
111,840.—COTTON PRESS.—Robert J. Harrison, Raleigh, N. C.
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111,842.—EARTH CLOSET.—Duncan C. Hartman, Baltimore, Md.
111,843.—CLOTHES LINE FASTENER.—Henry J. Hendey, Wolcottville, Conn.
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111,845.—SPIKE EXTRACTOR.—Wm. S. Hough, Johnstown, Pa.
111,846.—PEN HOLDER.—Isaac Jacobs, New York city.
111,847.—SASH CORD FASTENER.—William N. Jackson, Muncie, Ind.
111,848.—THRASHING MACHINE.—William N. Jackson, Muncie, assignor to himself and Benjamin F. Jackson, Anderson, Ind.
111,849.—MACHINE FOR LINING PASTEBOARDS.—Gustav L. Jaeger, New York city.
111,850.—STOVE OVEN GRATE.—W. G. James, Richland Center, Wis.
111,851.—TREATING BONES, HORNS, HOOFS, ETC., FOR MANUFACTURE OF FERTILIZERS.—William Burr Johns, Philadelphia, Pa.
111,852.—ATTACHMENT TO PLOWS FOR SUBSOILING.—Ross Johnson, Lawrence, Kansas.
111,853.—GRAIN DRILL.—Benjamin Kuhns, Dayton, Ohio.
111,854.—PLOW.—John Lane (assignor to Hapgood & Co.), Chicago, Ill.
111,855.—MACHINE FOR BENDING WOOD.—Obadiah Marland, Boston, Mass.
111,856.—METALLIC CARTRIDGE.—Edwin Martin (assignor to himself, Samuel W. Porter, and James F. Cranston), Springfield, Mass.
111,857.—COMBINED CULTIVATOR AND HARROW.—John Maxton, Seybrook, Ill.
111,858.—BOOK SUPPORT.—John McCausland, Alexander McCausland, and William J. A. McCausland, Providence, R. I.
111,859.—TURNING LATHE.—Frederick B. Miles (assignor to Ferris & Miles), Philadelphia, Pa.
111,860.—WASH BOILER.—Stephen S. Miles, Delta, N.Y.
111,861.—COFFEE POT.—Watson J. Miller (assignor to Simons & Miller), Middletown, Conn.
111,862.—CONSTRUCTION OF CAR AXLES AND SHAFTS.—James Montgomery, Croton Landing, N.Y.
111,863.—MANUFACTURE OF SHOE SHANKS.—Stephen Moore (assignor to himself and Homer Rogers), Sudbury, Mass.
111,864.—PORTABLE LAUNDRY.—Jacob Morrison (assignor to Matilda D. Morrison), Indianapolis, Ind.
111,865.—MECHANISM FOR OPERATING PUNCHING AND EYELETING MACHINES.—Charles H. Morse, Boston, assignor to himself and William A. Brown, Lynn, Mass.
111,866.—WHIFFLETREE PLATES.—Francis B. Morse (assignor to H. D. Smith & Co.), Plantsville, Conn.
111,867.—ATTACHMENT FOR SEWING MACHINES.—Schama Moritz Moschcowitz, New York city.
111,868.—BARREL.—Henry G. Porter, Grand Rapids, Mich.
111,869.—ELEVATOR AND CONVEYER.—Thomas J. Powell, Naples, N.Y.
111,870.—COOKING RANGE.—John A. Price, Scranton, Pa.
111,871.—COMBINED AGRICULTURAL IMPLEMENT.—Charles E. Rand, Dubuque, Iowa.
111,872.—STOCK CAR.—Amos Rank, Salem, Ohio.
111,873.—RAILWAY STOCK CAR.—Amos Rank, Henry King, and Joel Sharp, Salem, Ohio.
111,874.—CHIMNEY FOR LIME KILNS.—William Rennyson, Norristown, Pa.
111,875.—DEVICE FOR OBSTRUCTING ANTS.—Emery Rooks, Trenton, Tenn.
111,876.—HORSE AND CATTLE POWDER.—Abraham Rudisill and Manrow Sell, Sell Station, Pa.
111,877.—FIRE EXTINGUISHER.—Enno Saunder, St. Louis, Mo.
111,878.—BEDSTEAD FASTENING.—John Schepler (assignor to himself and Shickle, Harrison & Co.), Lambertville, N. J.
111,879.—CONCRETE PAVEMENT.—John J. Schillinger, New York city.
111,880.—SPUR ATTACHMENT TO OVERSHOES.—H. Schwandt, New Orleans, La.
111,881.—LUBRICATOR.—Nicholas Seibert, San Francisco, Cal.
111,882.—JAPANNING EYELETS, BUTTONS, ETC.—S. N. Smith, Providence, R. I.
111,883.—CORN-DROPPING ATTACHMENT FOR HOES.—E. L. Staples, Chillicothe, Ohio.
111,884.—LOCOMOTIVE BOILER FURNACES.—A. J. Stevens, San Francisco, Cal.
111,885.—APPARATUS FOR ASCERTAINING THE PROOF-SPIRITS IN FERMENTED MASH.—Giuseppe Tagliabue, New York city.
111,886.—PAPER FILE.—Jesse F. Tapley, Springfield, Mass.
111,887.—COOKING STOVE.—Nicholas S. Vedder, Troy, N. Y.
111,888.—CLOTHES DRYER.—J. K. Wagner, Potsdam, N. Y. Antedated February 3, 1871.
111,889.—PINCERS FOR SHOEMAKERS.—Michael Walpole, Milford, Mass. Antedated February 4, 1871.
111,890.—JOINERS' PLANE.—Geo. A. Warren, North Bridgewater, Mass.
111,891.—TIP FOR WOODEN SHOVELS.—W. P. Wentworth, Seneca Falls, N. Y.
111,892.—GAGE FOR THE CONSTRUCTION OF SEAT CUSHIONS.—John H. Williams, Pleasant Hill, Ohio.
111,893.—VAPOR BURNER.—Joseph S. Wood, Philadelphia, Pa.
111,894.—PLANING MACHINE.—Solomon A. Woods, Boston, Mass.
111,895.—SCROLL-SAWING MACHINE.—S. M. Young, Jacksonville, Ill. Antedated February 2, 1871.

REISSUES.

4,258.—MACHINE FOR SCRAPING LEATHER.—James T. Barnstead, Peabody, assignor, by mesne assignments, to Geo. L. Newcomb, Salem, and James Perkins, Peabody, Mass.—Patent No. 101,081, dated March 22, 1870.
4,259.—PERFORATED SHEET RUBBER.—John Haskins, Boston, Mass.—Patent No. 67,298, dated July 30, 1867; reissue No. 3,100, dated August 25, 1868.
4,260.—BURNING KILN.—Balthasar Kreischer, New York city.—Patent No. 81,738 dated September 1, 1868.
4,261.—FOLDING LOUNGE.—James W. McDonough, Chicago, Ill.—Patent No. 60,400, dated December 11, 1866.
4,262.—MACHINE FOR FIGURING CARPENTERS' SQUARES.—Norman Millington Shafts ury, Vt., assignor, by mesne assignments, to The Eagle Square Company.—Patent No. 10,136, dated October 18, 1853; extended seven years.
4,263.—MACHINE FOR CUTTING STONE.—George Morgan, Brooklyn, N. Y.—Patent No. 22,569, dated January 11, 1859.
4,264.—MACHINE FOR CHANNELING STONE.—Thos. Ross and Rockwood Barrett, Rutland county, Vt., assignees, by mesne assignments, of A. T. Merriman and Thomas Ross.—Patent No. 56,856, dated Nov. 20, 1866.
4,265.—MACHINE FOR REDUCING CRACKLINGS, ETC., FOR FERTILIZERS.—Armor Smith, Cincinnati, Ohio. Patent No. 71,565, dated Nov. 26, 1867.

DESIGNS.

4,646.—INFANT'S SHOE.—Willard M. Carpenter, Rowley, Mass.
4,647 and 4,648.—STOCKING FABRIC.—Thomas Dolan, Philadelphia, Pa. Two patents.
4,649.—CALENDAR CLOCK DIAL.—Daniel J. Gale (assignor of one half his right to Aaron Huyck), Sheboygan Falls, Wis.
4,650.—FLOWER STAND.—Hiland H. Kendric, Fulton, N. Y.
4,651 and 4,652.—CARPET PATTERN.—Hugh S. Kerr (assignor to Israel Foster), Philadelphia, Pa. Two patents.
4,653.—ENGINE GOVERNOR CASE.—John Augustus Lynch, Boston, Mass.
4,654.—FLOOR CLOTH PATTERN.—Charles T. Meyer, Newark, N. J., assignor to Edward C. Sampson, New York city.
4,655 to 4,661.—FLOOR OIL CLOTH PATTERN.—Charles T. Meyer, Newark, N. J., assignor to Edward C. Sampson, New York city. Seven patents.
4,662.—FRINGE.—Henry Asbury Truitt (assignor to Thomas Dolan), Philadelphia, Pa.
4,663.—TASSELED FRINGE.—Henry Asbury Truitt (assignor to Thomas Dolan), Philadelphia, Pa.

TRADE-MARKS.

155.—PLOW AND OTHER AGRICULTURAL IMPLEMENTS.—John C. Bidwell, Pittsburgh, Pa.
156 to 158.—SMOKING TOBACCO.—John W. Carroll, Lynchburg, Va. Three Patents.
159.—GINGER ALE AND WINTER BEVERAGE.—Anderson Carson and William Lemon, Hartford, Conn.
160.—COMPOSITION COATING.—D. B. Crockett, New Haven, Conn.
161.—STOVE.—Ignatius Droege & Co., Covington, Ky.
162.—PREPARATION FOR THE HAIR.—C. E. Georger, New York city.
163.—LACE GOODS.—A. G. Jennings, New York city.
164.—ILLUMINATING OILS OR BURNING FLUIDS.—William E. Jervey, New Orleans, La.
165.—MEDFORD RUM.—Daniel Lawrence & Sons, Boston, Mass.
166.—MEDICAL COMPOUND.—Pemberton, Taylor & Co., Atlanta, Ga.
167 and 168.—MEDICAL PREPARATION.—W. S. Wells and J. J. Steel, New York city. Two Patents.

EXTENSIONS.

METHOD OF FEEDING LUMBER LATERALLY IN SAWING MACHINES.—S. R. Smith, of Cincinnati, Ohio.—Letters Patent No. 16,454, dated January 20, 1857.
HARROW.—D. W. Shares, of Hamden, Conn.—Letters Patent No. 16,498, dated January 27, 1857; reissue No. 45, dated March 2, 1861.
MACHINE FOR CUTTING VENEERS.—Peter Cook, of Tonawanda, N. Y.—Letters Patent No. 16,529, dated February 3, 1857.

DISCLAIMERS.

METHOD OF FEEDING LUMBER LATERALLY IN SAWING MACHINES.—S. R. Smith, of Cincinnati, Ohio.—Letters Patent No. 16,454, dated January 20, 1857.—Filed January 28, 1871.
PLATFORM SCALES.—F. M. Strong and Thomas Ross, of Vergennes, Vt.—Letters Patent No. 14,119, dated January 15, 1856.—Filed January 10, 1871.

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Intercolonial Railway, Commissioners' Office, Ottawa, 19th January, 1871.

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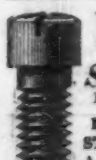

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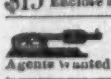

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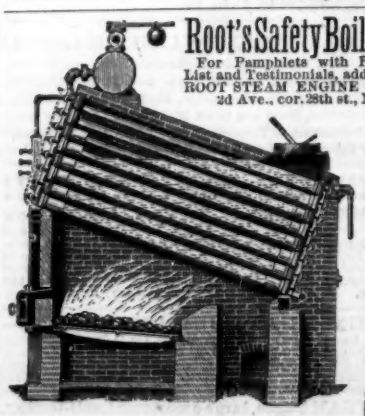

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